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# CANADIAN MACHINERY

## AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.  
Published by the MacLean Publishing Company, Limited, Toronto, Canada

Vol. XXII., No. 8.

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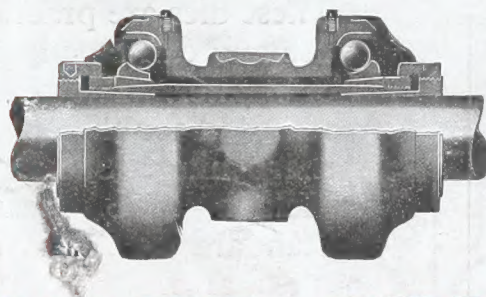
Subscription Price  
\$3.00 per year.

# CHAPMAN

## DOUBLE BALL BEARINGS

MADE IN CANADA

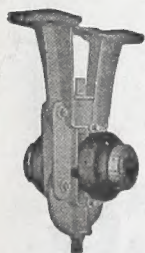
Fit all standard hanger frames and are interchangeable with self-oiling box of same size.



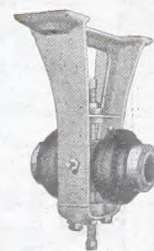
We also manufacture Annular and Thrust Bearings for automobiles and machinery.

## ELIMINATE FRICTION

### AND SAVE LUBRICATION COSTS



YOU PAY FOR THEM  
WHETHER  
YOU BUY THEM OR NOT



Send For Catalogue No. 3-B

*See Our Exhibit: Toronto Exhibition, Machinery Hall*

**The Chapman Double Ball Bearing Company**  
OF CANADA, LIMITED 339-351 Sorauren Ave. TORONTO, CANADA

TRANSMISSION BALL BEARING CO., Inc., 1050 Military Rd., Buffalo, N.Y.

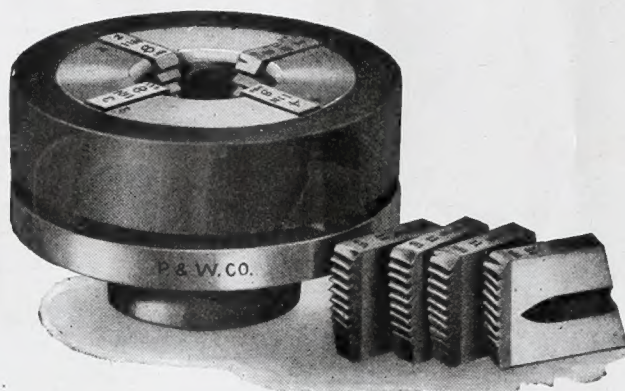


CANADIAN MACHINERY

# SMALL TOOLS

## PROMPT SERVICE

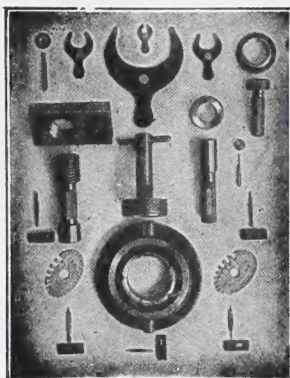
is assured at our nearest store where P. & W. Small Tools are carried in stock. Place your order there to-day.



## P. & W. Die-Stock Dies

These dies are practically solid when in use and can be adjusted 1-32 in. larger or smaller. The chasers can be quickly removed for the purpose of renewal or sharpening. Standard sizes furnished include U. S. Standard, Whitworth Standard, S. A. E. Standard and "V" form, all right hand; also special right-hand Briggs Standard taper pipe thread.

The Pratt & Whitney policy of highest quality materials, together with the necessary refinement and accuracy, is maintained.



PRATT & WHITNEY  
Standards and Gauges  
Accuracy Unequalled

# PRATT & WHITNEY CO.

OF CANADA, LIMITED

Works: Dundas, Ontario

MONTREAL  
723 Drummond Bldg

TORONTO  
1002 C.P.R. Bldg.

WINNIPEG  
1205 McArthur Bldg.

HALIFAX  
Davidson Building

VANCOUVER  
B.C. Equipment Co.





# BERTRAM MACHINE TOOLS

## For Structural, Bridge and Shipbuilding Plants

Modern in design and built for heavy service, our line embraces a varied equipment of Punches, Shears, Bending and Straightening Rolls, Coping Machines, Rotary and Plate Planers.

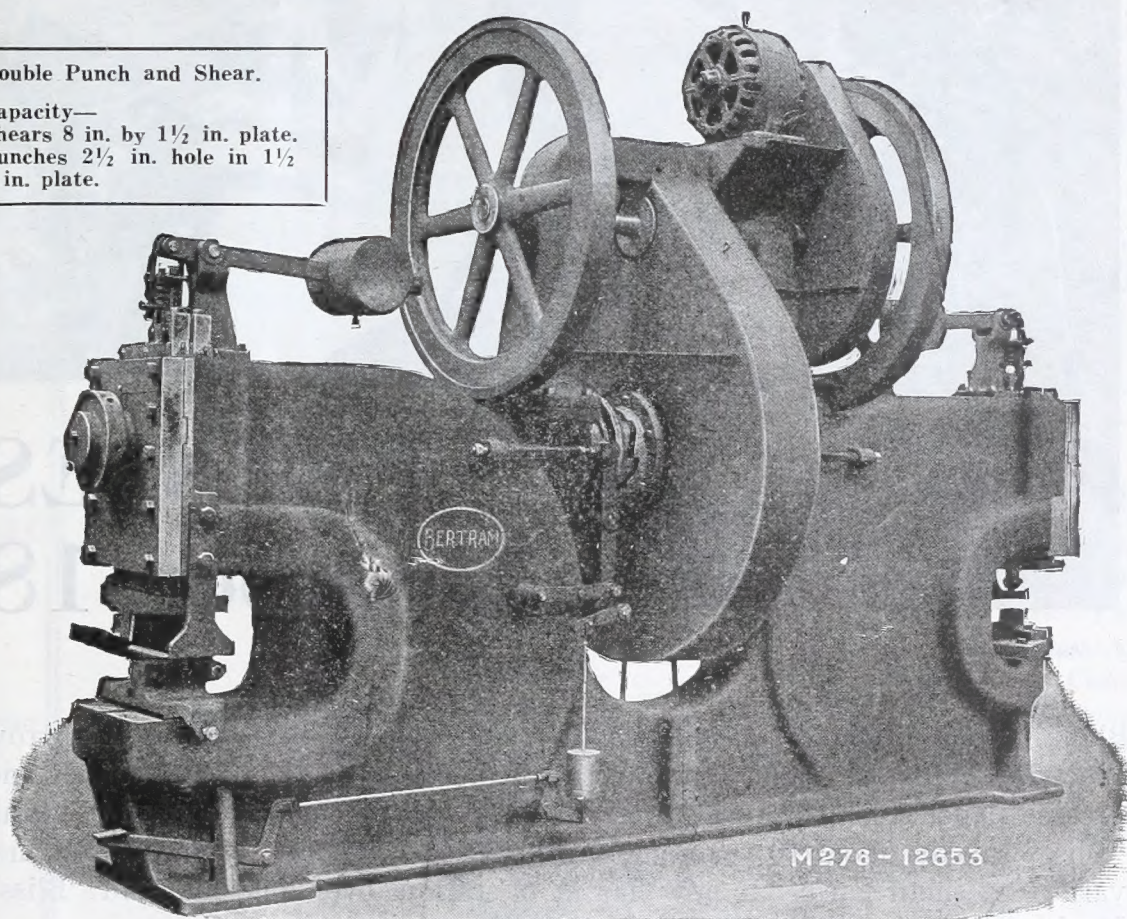
The assistance and advice of our engineers are yours for the asking.

Double Punch and Shear.

Capacity—

Shears 8 in. by  $1\frac{1}{2}$  in. plate.

Punches  $2\frac{1}{2}$  in. hole in  $1\frac{1}{2}$  in. plate.



## The John Bertram & Sons Co., Limited

DUNDAS, ONTARIO, CANADA

MONTREAL  
723 Drummond Bldg.

TORONTO  
1002 C.P.R. Bldg.

VANCOUVER  
609 Bank of Ottawa Bldg.

WINNIPEG  
1025 McArthur Bldg.

HALIFAX, Davidson Bldg.







(Photograph by courtesy of our customer)

## PRESSES Number 18

Blanking, cupping and stamping electric light wiring device parts in the Arrow Electric Company's plant at Hartford, Connecticut. Steel, brass, copper and pressed paper stock,  $1/64$  to  $3/32$  thick is used. The company began to install "Bliss" Presses about 10 years ago. It required a high rate of production on a variety of small parts. It now has in operation over one hundred "Bliss" Machines and is getting the production it wants.



1857

# E. W. BLISS COMPANY

Main Office and Works: BROOKLYN, N.Y., U.S.A.

CHICAGO OFFICE  
People's Gas Bldg.

DETROIT OFFICE  
Dime Bank Bldg.

CLEVELAND OFFICE  
Union Bank Bldg.



1919

LONDON, ENGLAND, Pocock Street, Blackfriars Road, S. E.  
No. 7

PARIS, FRANCE, 100 Boulevard Victor-Hugo St. Ouen



**BY-PRODUCT COKE**  
SULPHATE  
of AMMONIA

**"HAMILTON" PIG IRON**  
Basic Malleable Foundry

**STEEL & IRON CARS**  
OPEN HEARTH  
STEEL SHEETS

## FORGINGS

Car Axles  
Shape and Drop  
Forgings  
Carriage and  
Automobile  
Hardware

## POLE LINE HARDWARE

(Black and Galvanized)

Pole Steps  
Cross Arm  
Braces  
Guy Clamps  
Guy Rods

## SCREWS

Steel, Brass  
and  
Bronze  
Wood and  
Machine  
Screws

## NAILS, SPIKES & RIVETS

Wire  
Cut  
Boat and Horse  
Shoe Nails  
Railway  
Pressed and  
Drift Spikes  
Tacks  
Shoe Nails  
Steel and  
Copper Rivets  
Burrs

# Purchase the Products of Canadian Mills

**T**O uphold the Glory we have jointly earned—to honor our noble dead—to comfort the wounded, and extend to the men returned the hand of prosperous welcome, we must cast aside all forebodings and face the future with unbounded courage and confidence and, without a shadow of doubt, declare to the World that this Nation, which was so quickly and successfully transformed to a War basis, can be depended upon to revert to Peace conditions with equal success. The buyer and seller must recognize their duty to the Nation and co-operate fully to the end that all products that can be produced in Canada by Canadian workmen shall not be purchased elsewhere.

**O**UR Duty is plain; Canada with Canadian labor and capital can produce, manufacture and distribute products sufficient to keep the wheels of industry turning to the limit. The song of Prosperity and Happiness should ring out all over the land. Let us sincerely pledge to the extent of our needs, to purchase materials produced in Canada by Canadian Workmen, and the result of our efforts will return to us the Blessings of a Prosperous and Happy Nation.

## THE STEEL COMPANY OF CANADA

HAMILTON

LIMITED

MONTREAL

## RAILROAD TRACK MATERIAL

Angle Bars  
Track Bolts  
Tie Plates  
Tie Rods  
Spikes

## WROUGHT PIPE

Black Pipe  
Galvanized  
Pipe  
Nipples  
Couplings

## LEAD PRODUCTS

Lead Pipe  
White Lead  
Shot  
Putty

## WIRE

Steel & Brass  
Copper & Bronze  
Heavy and Fine  
Bright Annealed  
Coppered  
Galvanized and  
Tinned  
Stranded  
Steel and Copper  
Cable  
Clothes Line  
Staples  
Barb Wire  
Woven Wire  
Fencing  
Fence Gates

Bars

Blooms

Billets

Wire

Wire Rods

Sheets

Horse Shoes

Angles

Channels

Plow Beams



# ALGOMA STEEL CORPORATION, LTD.



SAULT STE. MARIE  
ONTARIO

## STEEL RAILS

Open Hearth Quality  
(All Sections from 12 lbs  
to 100 lbs per yard)

## SPLICE BARS

## STEEL TIE PLATES

## PIG IRON

BASIC, FOUNDRY-  
BESSEMER

## SULPHATE OF AMMONIA

## BLOOMS, BILLETS, SLABS,

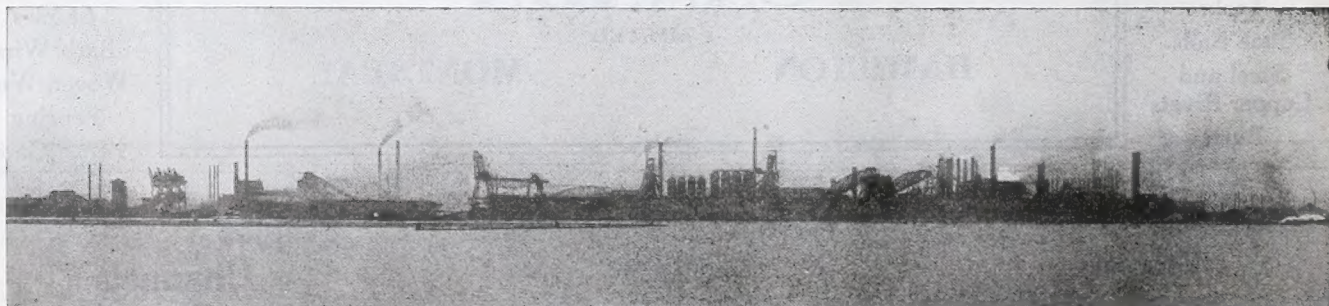
## STRUCTURAL STEEL

## MERCHANT BARS

## CONCRETE REINFORCING BARS

## IRON, BRASS AND BRONZE CASTINGS

*Sulphuric Acid. Nitre Cake.*

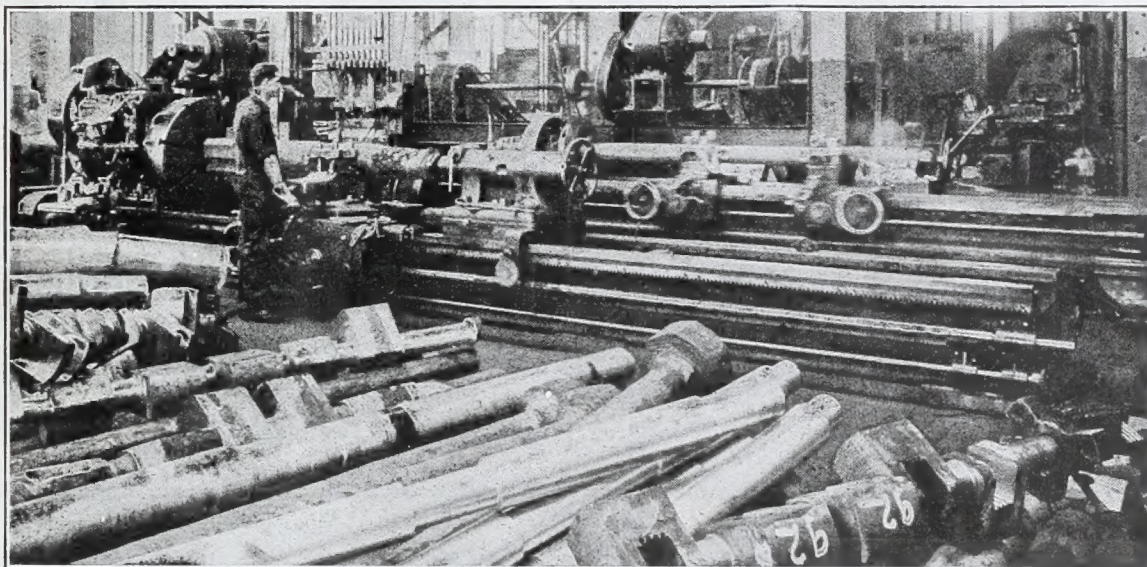


General View of the Plant of the Algoma Steel Corporation from the Waterfront.



# BRIDGEFORD

## Heavy Duty Lathes



The above photograph shows a Bridgeford 27" Manufacturing Lathe finish boring a cast-iron transmission housing for the new Fordson Tractor.

The diameter of housing is  $19\frac{1}{8}$ " and the limits of accuracy are .002".

Maximum production is a requirement in the Ford plant and that is why a Bridgeford was selected to do the work. The Bridgeford turns out

80 pieces per day of 8 hours, which is excellent production.

There's a Bridgeford for every heavy duty lathe requirement. Bridgefords are in operation in all parts of the world on all kinds of duty. The line includes Heavy Geared Head Engine Lathes from 24" to 72" swing, Cone Driven Engine Lathes, Axle and Journal Truing Lathes and Manufacturing Lathes of 27" and 30" Swing.

Send for interesting data on Bridgeford Lathes.  
We are in a position to make prompt deliveries.

### BRIDGEFORD MACHINE TOOL WORKS

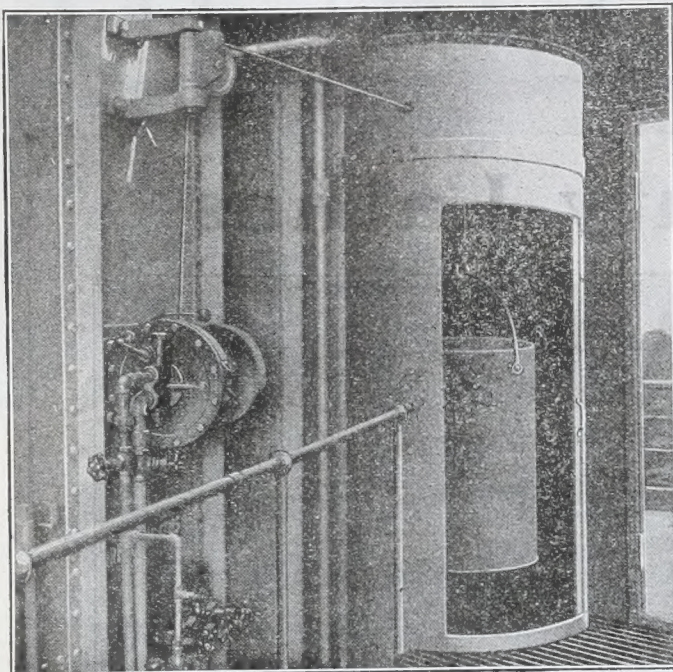
161 Winton Road, Rochester, N.Y.

*Manufacturers of Heavy Duty Lathes for more than 20 years.*

# BRIDGEFORD



# The "Little Tugger" Hoist on Shipboard



As an ash hoist the "Little Tugger" saves a great deal of hard work. It is extremely simple, remarkably compact, and has no projecting parts whatever. The "Little Tugger" is powerful, speedy and has a strong band brake, giving complete control.

Bulletin 4333, and "Billyisms" show many other uses for "Little Tugger" in the shipyard and in construction work.

Ask our nearest branch for your copies.

## Canadian Ingersoll-Rand Company Limited

Sydney Sherbrooke Montreal Toronto  
Cobalt Winnipeg Nelson Vancouver

### Swedish Steel & Importing Co., Limited

Montreal  
New York

Direct representatives of foremost Swedish mills; makers of

Toronto  
Denver

## Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.



PROMPT SHIPMENTS from large stock



A  
Keen  
Cutter

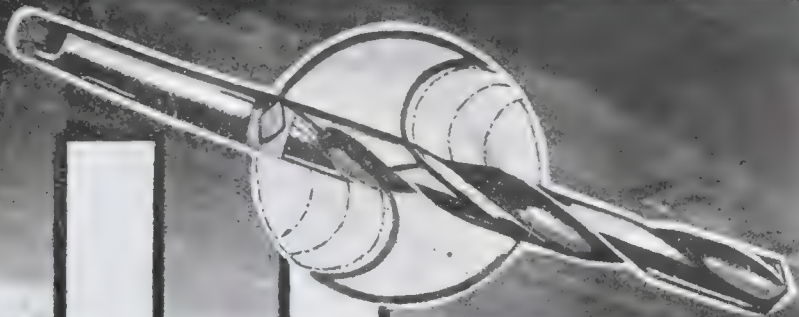
**WOLFRAM**  
*Is Both*

**VULCAN CRUCIBLE STEEL CO.**  
ESTABLISHED 1900  
Aliquippa Pa. U.S.A.  
Represented in Canada by Messrs Norlon  
Callard & Company  
MONTREAL QUE.

Strong  
in the  
Neck



# WILT



WILT

**HIGH SPEED  
AND CARBON  
TWIST DRILLS**  
REAMERS & MILLING CUTTERS

Illustration shows a Wilt Twist Drill in active service at the new shops of the Canadian National Railway, Leaside, Ontario.

Wilt Quality improves production and cuts drilling costs to a minimum.

This is no theory, no untested statement, but an established fact backed by many of the largest manufacturers throughout Canada. For steady, reliable output of work that is satisfactory from the standpoint both of quantity and quality there is no better choice than WILT products.

*"Where there's a WILT There's the Way"*

**WILT TWIST DRILL COMPANY**

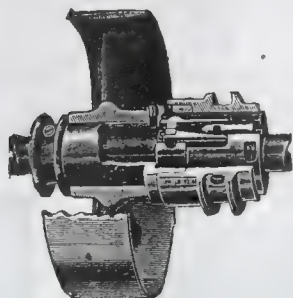
OF CANADA, LTD.

WALKERVILLE, ONT.

London Office: Wilt Twist Drill, Agency, Moorgate Hall,  
Finsbury Pavement, London, E.C. 2, England.

Manufacturers of a paramount line of Twist Drills, Reamers and Milling Cutters

# THE JOHNSON FRICTION CLUTCH



Standard Single Clutch with  
Pulley Mounted on Hub  
—Clutch Engaged.

**M**ANUFACTURERS who are particular about keeping an established reputation equip all their machines with Johnson clutches. They recognize that superiority must be consistent in order to count. And Johnson clutches assure them of uniformly good service wherever they are installed.

Other clutches might work well in some cases—but Johnson clutches are *sure* for all purposes. We study each application on its own conditions, and build a clutch that is just right for the job.

When you are tired of experimenting, let us have a chance.

**WRITE FOR OUR YELLOW DATA SHEETS**

CANADIAN AGENTS:

**WILLIAMS & WILSON, LIMITED, 84 Inspector Street, Montreal.**  
**CANADIAN FAIRBANKS-MORSE CO., LIMITED, Montreal, Toronto and Winnipeg.**

**THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.**



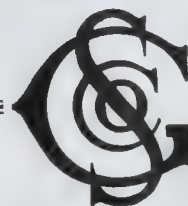
## ELECTRIC Steel Castings

High Grade STEEL Castings  
Of Every Description

**Prompt Deliveries**

Send us your drawings  
for estimates.

**THE ELECTRIC STEEL AND METALS  
COMPANY, LIMITED**  
WELLAND ONTARIO



## Forging Billets and Bars Electric Furnace, Alloy Steels Die Blocks

Annealed—Heat Treated

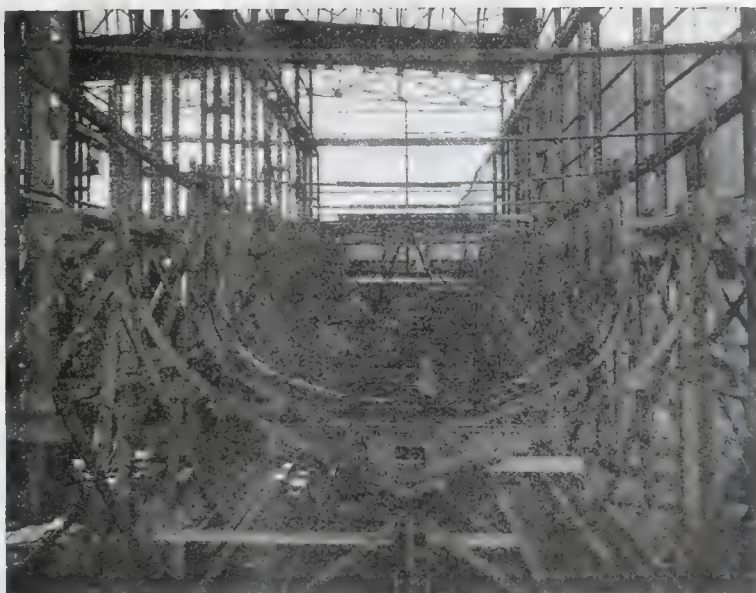
### Piston Rods

Rough Turned—Annealed—Heat  
Treated

### High Speed Steel

**General Steel Company**  
Milwaukee, Wisconsin  
DETROIT—823 Dime Bank Building





# SHIP CASTINGS IN STEEL

STERN and RUDDER FRAMES,  
SHAFT BRACKETS, ANCHORS,  
ETC.

## CANADIAN STEEL FOUNDRIES LIMITED

Transportation Building, Montreal

# Electrite

Electric furnaces, automatically regulated, the most modern methods, and the introduction of Uranium — make this a steel of truly remarkable cutting properties.

We know "Electrite" cannot be bettered — and stand ready to prove it to you.

LATROBE  
ELECTRIC STEEL CO.  
LATROBE, PA.

## High Speed Steel

# uranium

# MAC KINNON STEEL CO., LTD.

*Engineers, Manufacturers  
and Erectors of Steel  
Structures*

Industrial Bridges, Buildings, Towers, Smoke Flues and Stacks, Chutes, Coal Bins, Ore Bins, Tanks, Cranes, Engine Houses, Grain Elevators, Dericks.

Structural Steel and Steel Plate Work, and a combination of the two lines.

*Prompt Deliveries Assured.*

**MacKINNON STEEL CO., LIMITED**  
Sherbrooke, Quebec  
Montreal Office: 404 New Birks Building

# FORD-SMITH GRINDERS

FOR EVERY  
CLASS OF WORK



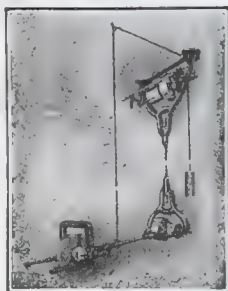
General Purpose Grinder



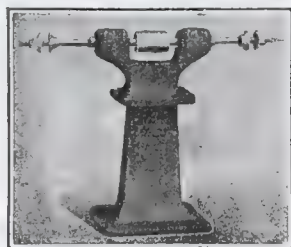
Water Tool Grinder



Heavy Type Floor Grinders



Swing Grinder



Polisher and Buffer

Modern, rigid, well-balanced machines  
that give real grinding service.

Manufactured by

**The Ford-Smith Machine Co.**

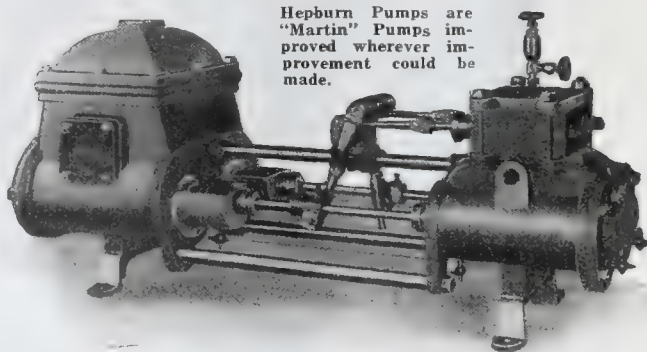
LIMITED

HAMILTON, ONT. - CANADA

## Hepburn Pumping Machinery

Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.

Hepburn Pumps are  
"Martin" Pumps im-  
proved wherever im-  
provement could be  
made.

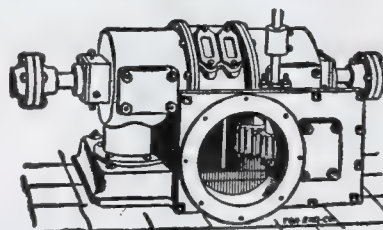


**JOHN T. HEPBURN, LIMITED**

18-60 Van Horne Street

Toronto, Ontario

## WATER POWER DEVELOPMENT



Over forty years' experience in design-  
ing and installing special turbines, both  
on vertical and horizontal shafts.

Can supply complete equipment, in-  
cluding flume, turbine and power trans-  
mission.

Stock of standard vertical shaft Little  
Giant Turbines on hand for prompt  
shipment.

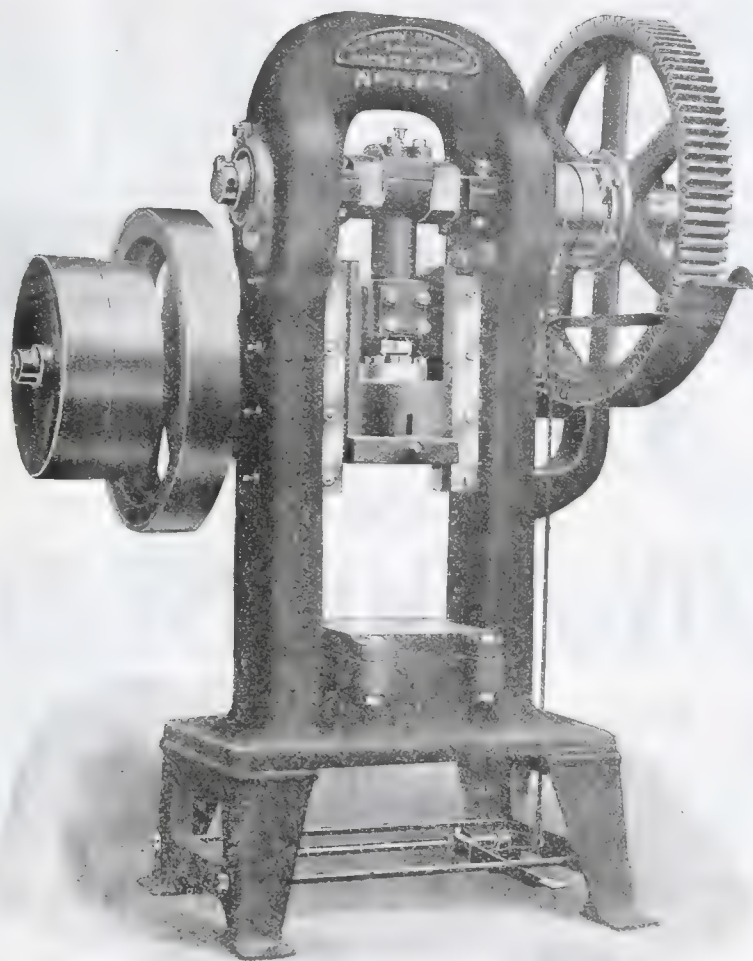
We solicit your inquiries.

**THE J. C. WILSON 'MFG. CO.**

LIMITED

BELLEVILLE, ONTARIO





No. 740 $\frac{1}{2}$  Geared Press

## The Manufacturer's Guarantee

Something you do not get with second-hand equipment, yet in many cases it will offset the difference in price between the second-hand and new machine.

*Play Safe*, get our prices on new equipment before you close for the old.

A large stock of different sizes and styles of presses on hand for immediate shipment.

**The Brown, Boggs Co., Limited**  
Hamilton, Canada

*Manufacturers of Sheet Metal Working and Tinsmiths' Tools and Machinery,  
Presses, Shears, Rolls, etc.*



# BRITAIN'S BEST

## KE

# BRANDS OF ALLOY & TOOL STEELS

In Billets, Bars, Sheets, Hot and  
Cold Rolled Strips, Cold Drawn  
Cast Steel, Wire and Drill Rods  
HIGH GRADE STEEL FOR ALL PURPOSES



Our Principal Trade Marks

# KAYSER ELLISON & CO LTD

ESTABLISHED 1825  
Complete Stock

SHEFFIELD, ENG.  
Montreal Warehouse

## RALPH B. NORTON

Agent

126 Craig St. West

Montreal, Que.



# CANADA FOUNDRIES & FORGINGS LIMITED



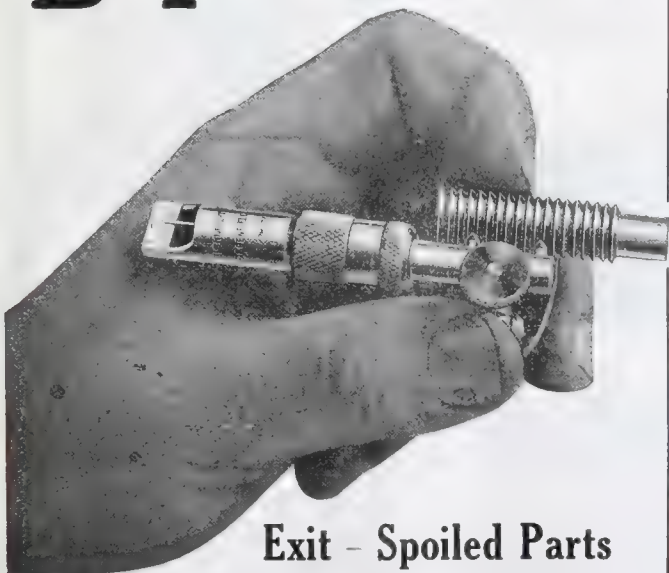
## DROP FORGED STEEL

all sizes

Produced at  
Canadian Billings &  
Spencer Plant  
Welland, Canada



## B-T THREAD LEAD INDICATOR



### Exit - Spoiled Parts

Did you ever have to scrap a threaded part because of incorrect measurement in lead? Were you ever forced, during a rush job, to thread a part over again, because it didn't fit as it should?

#### B-T THREAD INDICATORS

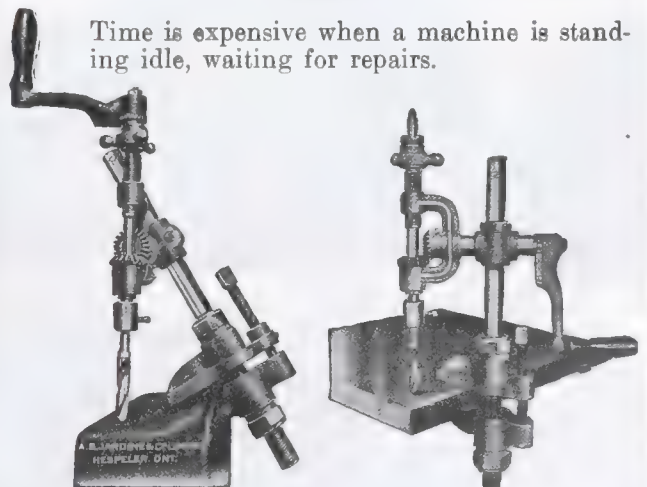
enable you to get the right thread lead instantly and maintain a constant check upon it. They will detect errors of one thousandth of an inch--can be used for testing add and even pitches, as well as internal and external threads.

SEND FOR OUR BOOKLET

**BICKNELL-THOMAS CO., Springfield, Mass.**  
Canadian Representatives: The James Bursley Co., St. Nicholas Bldg., Montreal, P.Q.

## Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, \$26.50 net

Sold by all Machinery and Supply  
Houses

**A. B. JARDINE & CO., Limited**  
HESPELER, ONTARIO



# “WACO”



TRADE MARK

## HIGH SPEED STEEL



TRADE MARK

“DOUBLE WACO” 18% Tungsten, for Railway and Tramway Tires and Hard Metals

“WACO” 14% Tungsten, for Turning, Planing and Slotting Tools, Milling Cutters, Taps, Rimers, Twist Drills

### CARBON TOOL STEELS

for

Engineers', Railway, Boilermakers', Shipbuilders', Miners and Blacksmiths' purposes in various qualities  
Diamond Special Extra Best Quality Best Warranted  
Warranted Ordinary

Each quality supplied in different tempers to suit tool required

### DIE STEELS

for

Screwing Dies, Stamping Dies, Top and Bottom Nail Dies, Cartridge Dies, Mint Dies, Dies for Hot Stamping, Drawing Dies

### COMBINED IRON AND STEEL

for

Beds, Dies, Machine Irons, Blades, etc.

### MINERS' DRILL STEEL

In three qualities

Extra Special Special Ordinary

### HOLLOW DRILL STEEL

Round or Octagon

Stainless Cutlery Steel Single or Double Shear Steel

### SPECIAL MAGNET STEEL

Hammer and Wedge Steel, Scythe and Sickle Steel

“WACO” High Speed Twist Drills Carbon Twist Drills

## MARSHALL, SON & BUNNEY

39 Richmond Street East TORONTO, ONT.

SOLE CANADIAN AGENTS FOR

WM. ATKINS & CO., LIMITED  
SHEFFIELD - - ENGLAND

PRICES ON APPLICATION FOR  
IMPORT OR STOCK ORDERS

Coal  
Coke  
Iron Ore

# Pig Iron

Victoria

FOUNDRY & MALLEABLE

Made by The Canadian Furnace Co.  
Port Colborne, Ontario, Canada

## M.A. HANNA & Co.

Sales Agents:

CLEVELAND

Canadian Office:

904 C.P.R. Bldg., Toronto

# FIRTH'S

## Speedicut HIGH SPEED Steel

Insures Maximum Production

### FIRTH'S CARBON TOOL STEELS

Standard Brands Highest Quality

THOS. FIRTH & SONS, Limited, Sheffield, England

CANADIAN WAREHOUSES 449 St. Paul St. West, MONTREAL  
77 West Adelaide St., TORONTO

J. A. SHERWOOD  
Canadian Manager



# Starrett

## Hack Saws

Cut faster!—repeated tests have proven the soundness of the Starrett system of designing different blades for different classes of work. It's the number of strokes to the cut that determines the comparative efficiency of blades—the number of cuts to the hour. And it is the ability of the Starrett blade not to only complete the cut with the minimum number of strokes, but to deliver a greater number of cuts during the life of the saw, that has made its reputation.

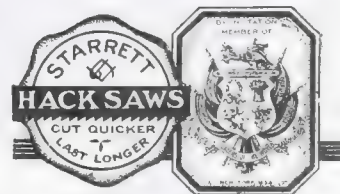
To get the most out of a box of Starrett blades, use the Starrett Hack Saw Chart 3, sent free upon request.

### The L. S. Starrett Co.

*The World's Greatest Toolmakers.*  
*Manufacturers of Hack Saws Unexcelled.*

Athol, Mass.

42-958





# STEEL *for*

## Every Commercial Purpose

We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

We can supply forgings of all shapes and sizes made of ordinary or "HARMET" Fluid Compressed Open-Hearth Steel on the Shortest Notice.

**Nova Scotia  
Steel and Coal  
Co., Limited**

*Head Offices:*  
**New Glasgow, N.S.**

*Western Sales Offices:*  
**Room 14 Windsor Hotel  
MONTREAL**

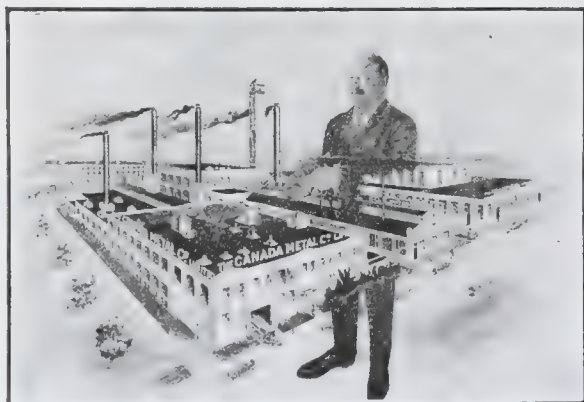


**Steel Ingots**

*by the*

**HARMET**

**Liquid Process**



*Here is a Plant at your Service*

We Make

**LEAD PIPE, SHEET LEAD,  
SOLDER**

**All Grades of BABBITT METAL,  
Ingot Copper, Tin, Lead, Brass.**

**THE CANADA METAL COMPANY LIMITED**

Toronto      Montreal      Winnipeg      Vancouver

**THE**



**FOUNDRY  
GALT - ONT.**

## Do Your Castings Cost Too Much?

A rearrangement of your patterns might cut their cost 25%; a different method of molding them might double your production at no increase in molding cost. We can advise you and we have expert metal and wood pattern-makers who are able to make any changes that may commend themselves to you.

### If you need some new Patterns

send us a sample, blueprint or sketch, and ask for our advice. It won't cost you anything. If our advice is good and commends itself to you, it is only fair to assume that our work will be equally satisfactory, and we need the work as badly as you need the patterns.

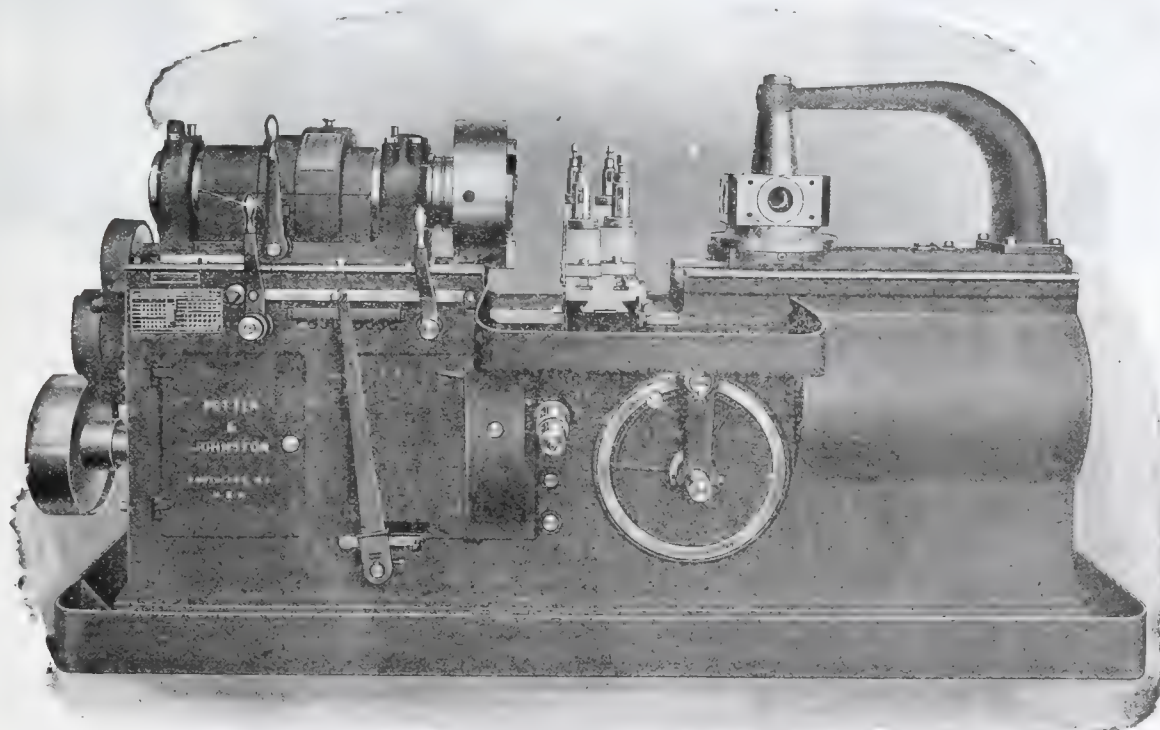
We are in a position to do turning, boring, drilling or other semi-finishing operations on castings supplied by us.

**ASK US**



# POTTER & JOHNSTON

MANUFACTURING AUTOMATICS  
FOR  
ECONOMICAL PRODUCTION



## 6A Manufacturing Automatic

When times are dull you want to get full value from your labor—you cannot afford to do otherwise and stay in the game.

When times are busy you have hard work getting help.

A serious problem from either angle.

The solution: Potter & Johnston Manufacturing Automatics for all duplicate parts from castings, forgings, cut-off stock, up to 40 inches diameter and up to 15 inches long.

From two to a dozen cutting tools always in simultaneous operation. Instead of an operator for each machine, an attendant for from two machines to half-a-dozen.

If you have any doubts as to whether these Manufacturing Automatics will apply on your work, take it up with us and we will help you investigate.

Descriptive Bulletin 39 on request.

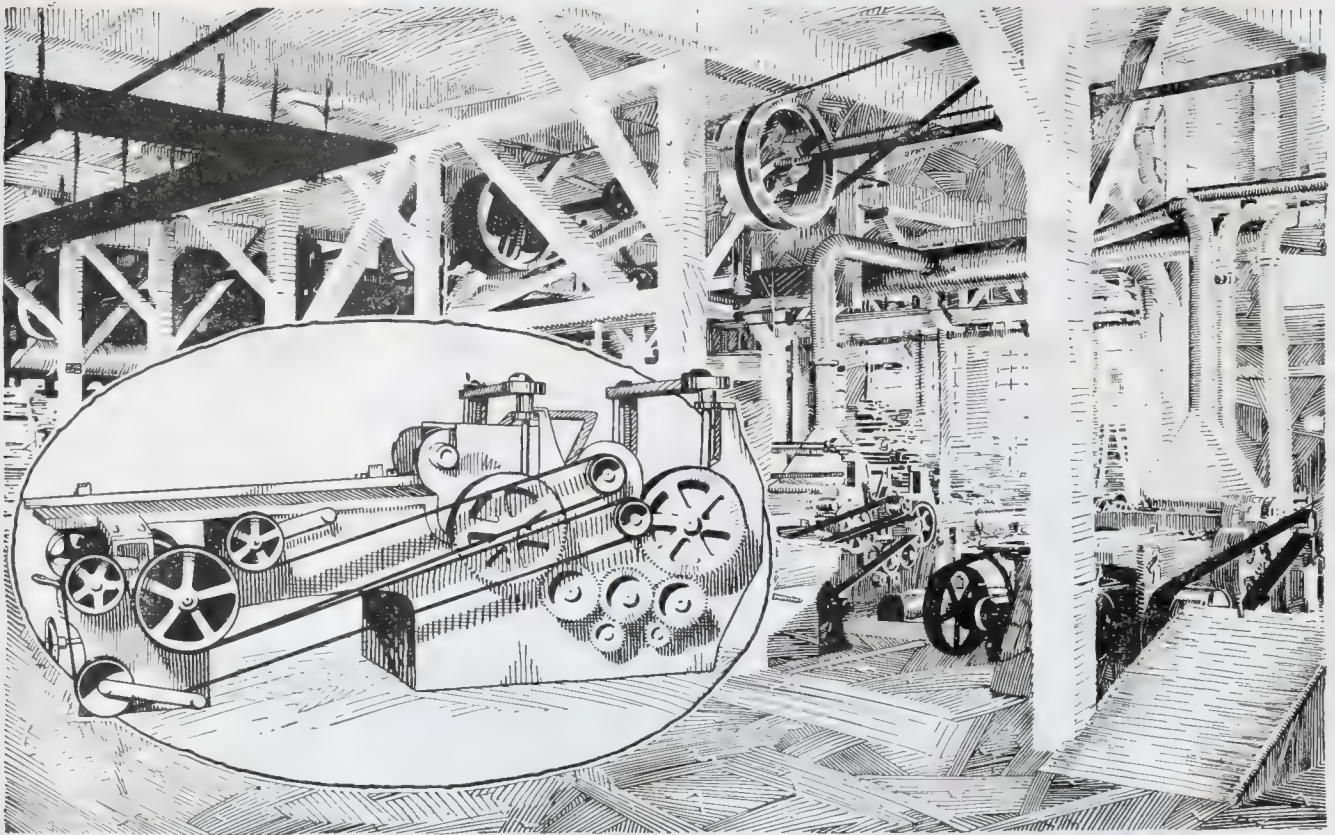
Canadian Offices: POTTER & JOHNSTON MACHINE CO.

**ROELOFSON MACHINE & TOOL CO., LTD.**

HEAD OFFICE: 1501 ROYAL BANK BUILDING, TORONTO, CANADA

WORKS AND WAREHOUSE: GALT, ONT., CANADA





*Scene in the Haley Mill Showing Goodyear Extra Power Belting in Use.*

## Another Convert

HALEY & SON,  
Lumber Merchants

Gentlemen:—

We want to tell you about the Goodyear Extra Power Rubber Belting we bought for our new mill two years ago and what great satisfaction this Belting has given us. As you are aware, we bought this kind of belting from you for the equipment of our mill **through-out**, even to planers and matchers. We were skeptical at the time about using this belting on our matchers, especially on the side heads, as that is a very trying place for any kind of a belt. We concluded we would try your rubber belting, as we thought then as a makeshift. Now it has been something over two years since we belted up our matchers with your belting and the original belts are yet on these machines and still giving good service. We thought where this belting of yours had proved so eminently satisfactory that we should tell you just as we thought about it and you know we are giving you this testimonial of Goodyear Extra Power Rubber Belting entirely at our own initiative.

Yours truly,

HALEY & SON.

**GOODYEAR**  
MADE IN CANADA



# Almost Unbelievable Power-Saving and Economy

Time and again we have found purchasers of Goodyear Extra Power Belting openly skeptical that it would live up to our promises.

Time and again they have told us not only of lower belting costs, but also of increased and faster production, time and power saved.

To-day there is no reason for any plant to buy belting on promises.

On file in our office are letters which enable you to buy belting by proof.

Records of Goodyear Belting performance.

Records of extreme long-life, which means economy.

Records of pulley-gripping, non-slip qualities which save power.

Records of work under strenuous conditions of heat, cold, damp, acids.

Records of strength and flexibility.

Records which prove that without Goodyear Extra Power Belting enough power is wasted in Canada every year by poor belts to pay a big dividend on Industry's capital.

Some of this power is being wasted in your plant. Better belting, scientifically applied, will save you money. Without obligation to you, a belting man, trained by Goodyear, will call and make a record of your needs and experiences. Our recommendation will come from engineers who fit belts to conditions. Phone, wire or write the nearest branch.

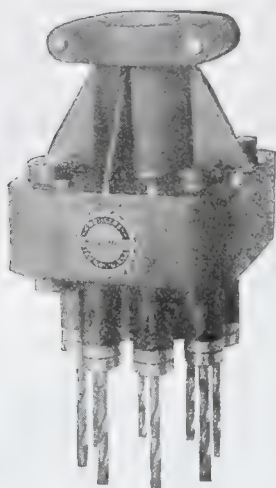
**The Goodyear Tire & Rubber Co.  
of Canada, Limited**

*Branches: Halifax, St. John, Quebec, Montreal  
Ottawa, Toronto, Hamilton, London, Winnipeg  
Regina, Calgary, Edmonton, Vancouver*

## EXTRA POWER BELTING



# 2 Minutes or 20?



## This Is The Vital Question

Do you drill ten holes in the time it takes for one? The Hoefer Auxiliary Head equips any driller so as to accomplish this big saving in time. It speeds up production in drilling tremendously. Not only do you save the drilling time, but also the time now lost in shifting the jigs and raising and lowering the spindle for the extra holes.

Hoefer Auxiliary Heads are made in any multiple, arranged in any manner, from 2 up. They are made by expert tool makers and unqualifiedly guaranteed to handle accurately the work for which they are designed.

Investigate now—every day you use a single drill where the multiple may be used you are paying for an auxiliary head through increased costs, but not securing its benefits.

Write for catalog. Send a blueprint of some of your work for estimate of time cost.



**THE**  
**HÖEFER**  
Mfg. Co., Freeport, Ill.

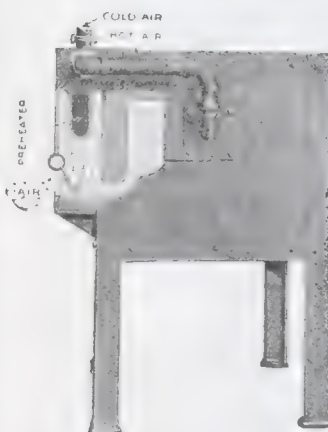
621 Washington Blvd., Phone Haymarket 2408, Chicago, Illinois; 1113 Citizens' Bldg., Phone Main 795, Cleveland, Ohio; 708 Empire Building, Phone Court 1911 or 1912, Pittsburgh, Pa.; 602 Kerr Building, Phone Cherry 2884, Detroit, Mich.; 30 Church Street, Phone Cortland 1615, New York City; Badger-Packard Mch. Co., Milwaukee, Wisconsin; National Supply Co., Toledo, Ohio.

**The Canadian Fairbanks-Morse Co., Limited**

*"Canada's Departmental House For Mechanical Goods"*

Halifax St. John Quebec Montreal Ottawa Toronto Hamilton Windsor  
Winnipeg Saskatoon Calgary Vancouver Victoria

## Cool Shop This Summer if you use ECONOMIZER FORGE



Showing deflection of hot gases, with induced air toward the furnace, and the preheating of air for combustion.

It is economical in fuel, air and power; protects workmen from flame and hot gases and the heated material from oxidation or scale; increases the quantity and improves the quality of heated products; prevents smoke, flame and heat escaping into the forge shop.

**Write to-day for  
catalogue 34-T**

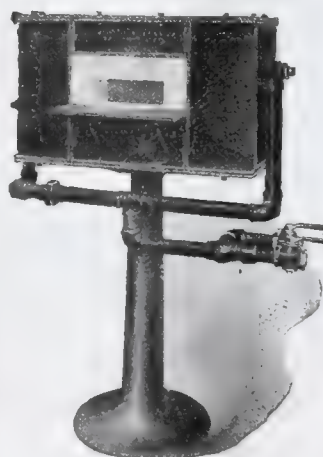
Canadian Representative:  
**R. J. McLEAN**  
128 Bleury St., Montreal, Canada.



## STANDARD FURNACES

OIL  
or  
GAS

*Prompt delivery on  
all tool room types*



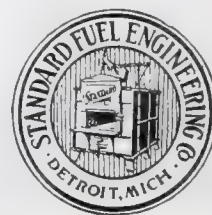
Cutting Tool Furnace

For  
Annealing  
Carbonizing  
Hardening  
High Speed Steel  
Lead and Salt  
Oil Tempering  
Forging  
Riveting

Furnaces built for special requirements

**STANDARD FUEL  
ENGINEERING CO.**

1646 Woodward Ave.  
Detroit, Mich.





# Nichrome Castings for Heat Treatment

## Cast "Nichrome" Heat Treating Containers

Carbonizing and annealing boxes, and other heat treating containers must be durable to withstand the action of heat during operation.

Cast iron, cast steel, structural steel and wrought iron receptacles **crack, grow, scale, or warp**, their use is inefficient, involving costly maintenance due to additional expenses for labor, fuel, material and constant replacement.

Cast Nichrome boxes, pots, tube and retorts guarantee uniform high quality of product, increase the capacity of the plant, and reduce the cost of heat treatment.

Write for further particulars.

Manufactured under Henderson Patents.

**CANADIAN DRIVER-HARRIS CO. Ltd.**

WESTERN OFFICE AND DEPOT  
CHICAGO  
20 50 JEFFERSON ST

**WALKERVILLE, ONT.**  
CANADA  
AMERICAN OFFICE AND WORKS  
HARRISON, N. J.

BRITISH WORKS  
MANCHESTER  
ENGLAND



**T**HERE is as much difference in the various makes of High Speed Steel as there is in men—

The practice and methods of manufacturers differ widely in every mill and anyone who is at all familiar with the manufacture of High Speed Steel thoroughly understands this

## "Red Cut Superior"

*The Nationally Known—First Quality*  
**HIGH SPEED STEEL**

is the best for all Machine Work

ARE YOUR TOOLS MADE OF "Red Cut"?

**VANADIUM-ALLOYS STEEL  
COMPANY**

Gen'l Offices: Pittsburgh, Pa.

Works: Latrobe, Pa.

BRANCH OFFICES:

TORONTO  
MONTREAL  
NEW YORK

BUFFALO  
BOSTON  
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CINCINNATI  
DETROIT  
PITTSBURGH

## Peerless <sup>HIGH</sup><sub>SPEED</sub>

**Has Proven Its Efficiency  
Where Others Have Failed**



DON'T turn down the "Peerless" because you have tried out other hack saws which did not answer your requirements.

Many concerns who were persuaded only with the greatest difficulty to try their first "Peerless," because they "just knew it would turn out like the others," are to-day among the largest and best-satisfied users of our High-Speed Saws.

The "Peerless" is different—and better. It does 50 to 100 per cent. more work, cuts with thinner saws and requires a minimum of attendance, saving time, labor, material, blades and floor space. What is your work? We can tell whether the "Peerless" will do it, and back our judgment with a 30-day trial. If it doesn't make good we pay freight both ways. Well?

**PEERLESS MACHINE CO.**

1607 RACINE STREET

RACINE, WISCONSIN

## Protexal Clothing

Is made of specially treated fire, water and acid-proofed duck material.

Has extra fasteners on sleeves and trouser legs permitting their being tightly fastened around wrist and ankles. **No gaping garments to catch in machinery.**

Designed for service, comfort and protection, outwears regular overalls, extremely strong, comparatively light weight.

An exceptional garment at a reasonable price.

Suits, leggings, gloves, mittens that actually reduce accident hazards. Booklet D-2 shows the

complete line of Protexal Clothing manufactured in our own plant.

Easiest to put on and take off.

**The Strong, Kennard & Nutt Co.**

Safety and First Aid Equipment  
Makers of Adjustoglas Goggles

2044 E. 9th St.

Cleveland, O.



# Gas Furnace Triumphs Over the Electric at Providence

Competition is keen in Providence, R.I., and therefore both the Electric Company and the Gas Company employ the best brains and selling talent on the market.

An Electric Furnace was recently installed in the Tool Room of a large manufacturing plant in that city, and it looked like a real triumph for the Electric Company, as the Gas Company, also, had been hot on the trail.

But the Gas Company wasn't discouraged.

They advised the customer to give the electric furnace the fairest kind of a trial.

They didn't knock.

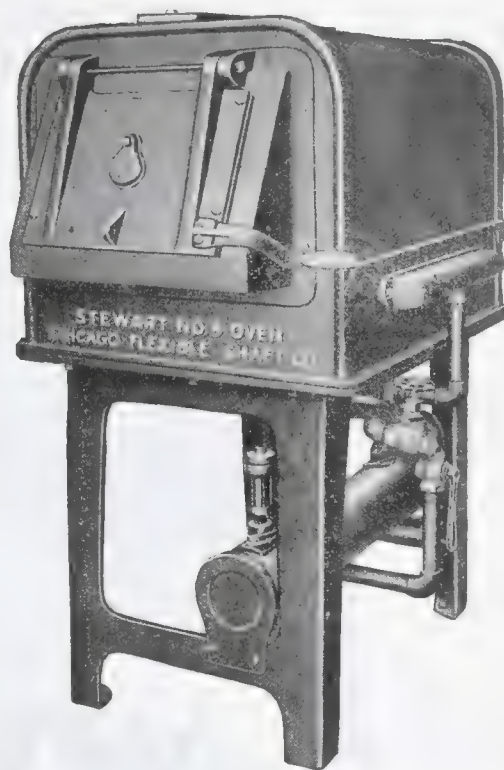
But they did do a lot of figuring of costs, and the result was so convincing that the customer agreed to the installation of a Gas Furnace, on trial, and then things got exciting.

The Customer, the Gas Man and the Electric Man all three watched and checked the performances of both furnaces.

Here is what they found out:

1. The Electric Furnace was costing \$20.00 per week.
2. The Gas Furnace was costing \$13.84 per week.

The Gas Furnace has replaced the Electric in that Providence factory.



## Stewart Gas Furnaces and Ovens

are doing more every day to demonstrate the superiority and the economy of Gas for Industrial uses over the use of electricity than any other one factor.

Is your Industrial Department aware of this, and if so are they using the information in your business-getting campaign this year?

There are over one hundred types of **Stewart Gas Furnaces and Ovens** being manufactured and sold to-day. Send for our illustrated catalog.

**CHICAGO FLEXIBLE SHAFT COMPANY**  
1148 So. Central Ave. Chicago



## *Adapted to all kinds of Rapid Manufacturing*

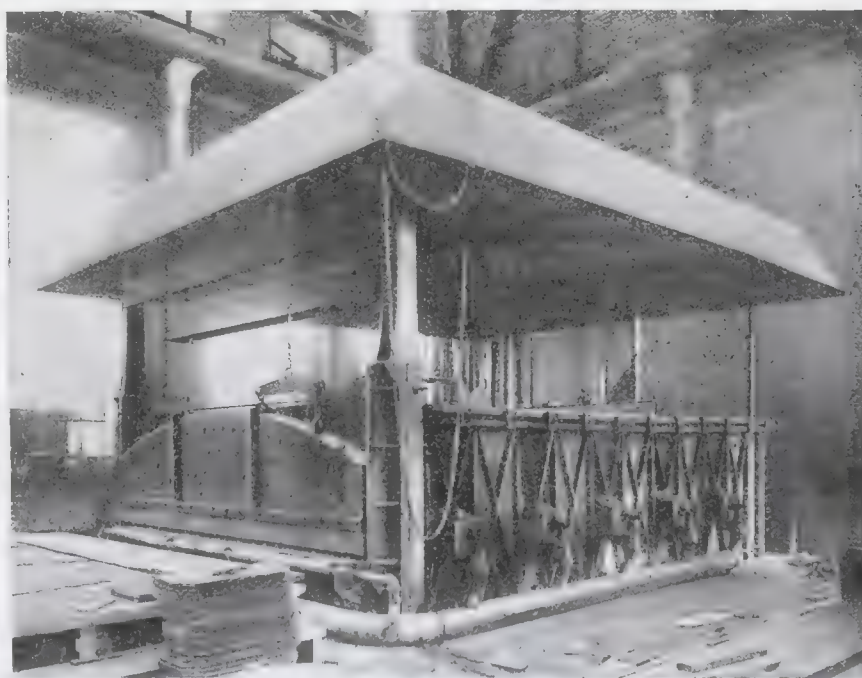
WHETHER your lathe requirements must suit the rapid manufacture of intricate parts or versatile demands of modern tool room practice, one of the Whitcomb-Blaisdell Line will fit exactly your individual needs. When you buy a Whitcomb-Blaisdell Lathe you get a big measure of service in return for every dollar invested. The entire line of W-B Lathes is distinguished for superior design, workmanship and material. Rigid inspection and thorough working tests in our shops are your assurance of accuracy and dependability.

**Whitcomb-Blaisdell Machine Tool Co.**  
WORCESTER, MASS., U.S.A.



Write To-day  
for our lathe  
Catalog which  
describes our  
complete line.

**Whitcomb-Blaisdell  
LATHES**



## Any Size

Illustration shows a Plate Heating Furnace installed in the plant of Canadian Vickers Ltd., Montreal.

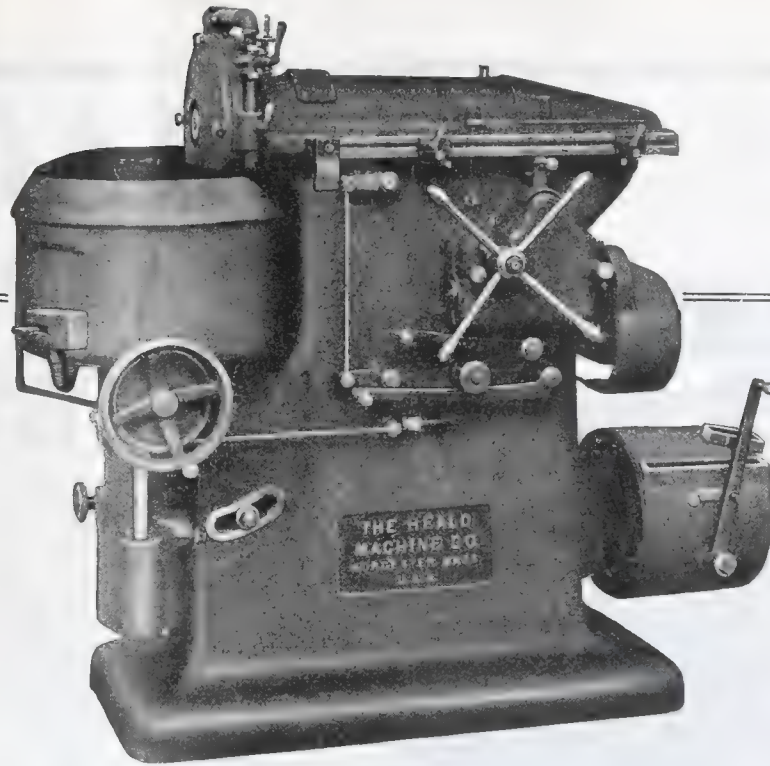
Your Proposition if out of the ordinary, would be bettered by our co-operation. Get in touch with us.

**Mechanical Engineering Co., Ltd.**

Room 308, Bank of Toronto Bldg., Montreal

Three Rivers, Que., Canada





BUILT IN TWO  
SIZES 8" and 12".

**The New Sur-  
face Grinder  
you have been  
looking for**

The new HEALD No. 20 and No. 22 MACHINE is a simple, productive and accurate rotary surface grinder. That the new machines meet the first requirements can be seen from the photograph above.

In regard to production and finish, experiments have proven these new machines have no equal in the field to-day.

The WHEEL SLIDE is a massive casting having a flat and "V" way insuring continued alignment. Bearing surfaces are large and well protected. Spindle belt operates with a downward pull; an important factor in rigidity.

The chrome nickel WHEEL SPINDLE is mounted in large bearings, all adjustments of which are made at grinding wheel end through an opening in top of slide.

The MAIN DRIVE UNIT receives power from the main line by tight and loose pulleys, transmitting it directly by belt to main speed box, wheel spindle and pump.

MAIN SPEED BOX, situated on the rear of machine, furnishes power to wheel slide by a 3-step

cone, and operates the chuck, which has three speeds, through a bank of gears. Wheel slide and chuck are independent of each other, permitting a large latitude in speeds and feeds.

Chuck spindle is driven by spiral gears, one of which is mounted directly on the spindle. Spindle itself is mounted in a sleeve which has vertical adjustment. Upper portion rests in a taper bearing, lower end being equipped with ball bearings—wear is automatically taken up. All control levers and adjustments are within easy reach of operator.

Complete water apparatus is furnished with each machine; built in two sizes, 8" and 12", with Heald Magnetic Chucks are regular equipment. Motor drive if desired.

**LET US SEND YOU SPECIFICATION AND LITERATURE**

**The Heald Machine Company**  
WORCESTER - - - - - MASS.

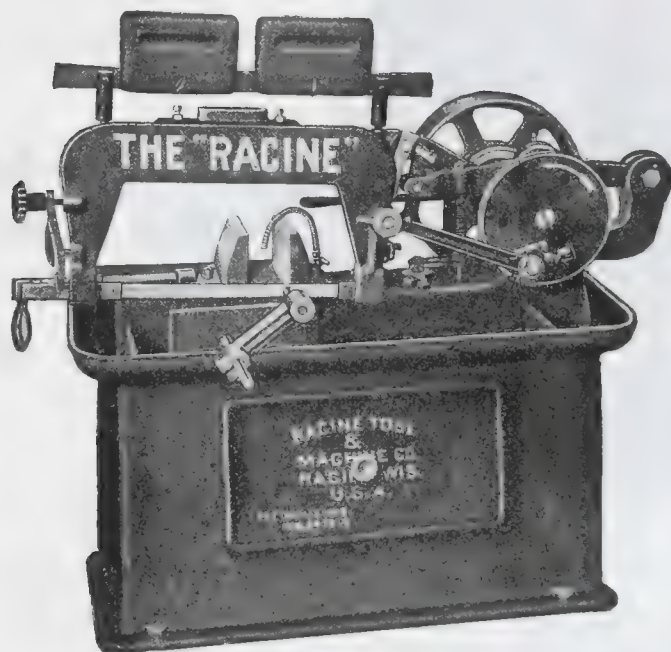


*Standard the  
World Over*

# "THE RACINE"

## HIGH SPEED METAL CUTTING MACHINE

### Reduces Blade Expense



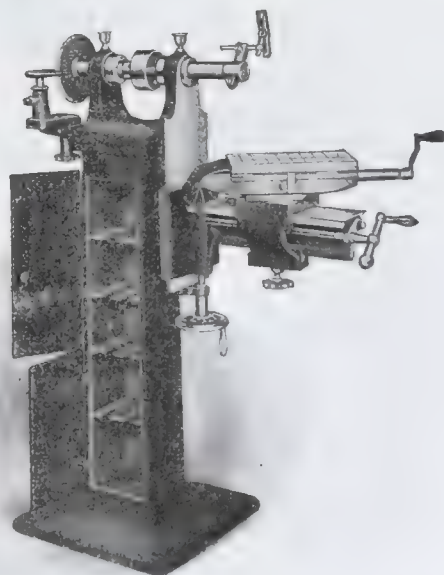
Aside from its ability to turn out more work than any other metal cutting machine, "THE RACINE" will save you considerable money on blades alone—enough to pay for itself in a reasonable time. The automatic lifting device is responsible for that. It automatically raises the blade on the return stroke, relieving it of all dragging or strain. This also means quicker cutting, less power used and greater production.

There are many ways "THE RACINE" will prove a big saving. Let us tell them to you.

Use "Racine" H.S. Tungsten Power Blades

**Racine Tool & Machine Co.**  
Melbourne Avenue - RACINE, WIS., U.S.A.

## OBTAIN THE BEST RESULTS



GARVIN No. 3, Universal Cutter  
and Surface Grinder  
Use Code—Banish

### From Cutters and Tools Kept Sharp on GARVIN No. 3 UNIVERSAL CUTTER AND SURFACE GRINDERS

Simple      Light Running      Accurate

The spindle is hardened and ground and supported out close to the wheel by an extended bearing, and carefully protected from emery.

The knee and the yoke carried on the knee both have a large range of adjustment. On the knee yoke or carriage is mounted the swiveling table, which has a quick, sensitive movement by rack and pinion operated from end or side.

On this table is mounted the index head, and all the attachments are held in this head.

An outfit of emery wheels, mandrels, bushings, wrenches, etc., is supplied with the machine.

Machine is designed to keep its original factory accuracy.

CAPACITY: CUTTERS, 14" x 6"; SURFACES, 9 1/2" x 6"

For Further Information ASK YOUR DEALER  
or WRITE US DIRECT

**IMMEDIATE DELIVERIES**

*Send for Complete Catalog*

Manufactured by  
**THE GARVIN MACHINE COMPANY**  
Spring and Varick Streets      (Visitors Welcome)      50 Years New York City

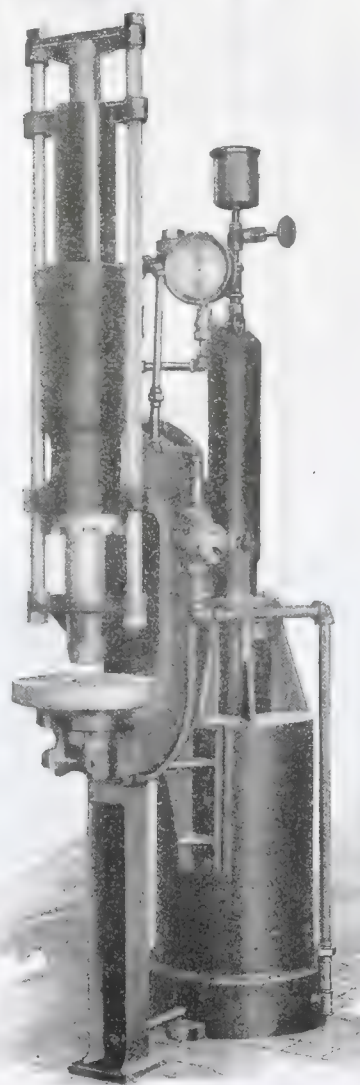


# ORIGINALITY

*is Characteristic Always of*

## "METALWOOD"

*DESIGNS and  
DEVELOPMENTS*



*The "Metalwood" line of these Quick Operating Hydro-Pneumatic Presses comprises a variety of styles, types and sizes.*

*By performance through a period of years, these presses have established themselves in a wide range of industries as standard tools for light straightening, broaching, forcing and assembly operations.*

*The "R-149" style press of 20-ton capacity shown here is described in our bulletin B-47.*

## METALWOOD MANUFACTURING CO.

*High Speed Hydraulic and Hydro-Pneumatic Machinery*

*DETROIT, MICHIGAN*

EXCLUSIVE SALES REPRESENTATIVES:

Canadian Fairbanks-Morse Co., Ltd., Montreal and Toronto; R. E. Ellis Engineering Co., 621 Washington Blvd., Chicago; Fairbanks-Morse & Co., Inc., 30 Church St., New York City; Sherritt & Stoer Co., Inc., Finance Bldg., Philadelphia, Pa.



## Notes On Grinding

NORTON COMPANY WORCESTER, MASS.

No. 62A

### Use Wheels of Large Diameter for Snagging Castings

#### SALESMAN'S COMMUNICATION

"One of our customers has raised the question of whether the diameter of a wheel will have any bearing on the cost of grinding, especially so on heavy work like steel castings. This customer in question uses 18" diameter wheels on swing frames. Kindly advise me if you have an actual data on this."

#### THE REPLY

We have no actual figures to show what the effect of wheel diameter is on the cost of snagging castings, but perhaps a brief general discussion is in order.

To take an extreme case, we would hardly use a 4" diameter wheel to snag castings, for the principal reason that you could not remove metal fast enough. Under usual power conditions for a 4" wheel it would slow down and stop just as soon as any considerable pressure was put upon it. Now an 18" diameter wheel, driven with proportionately larger belts and greater motor power, would have sufficient momentum to keep going, even under great pressure. There is no question that theoretically there is something to be gained from this flywheel effect which keeps the speed up and hence tends to reduce the wheel wear.

Another point is worth considering, and that is the arc of contact. The larger the diameter of the grinding wheel, the more cutting grains are at work each second, due to increased arc of contact. This makes for two things—faster cutting and less wheel wear.

Still a third factor is the greater economy in abrasive consumption that always exists when the grinding wheel is large and up to speed. Say that a steel foundryman is snagging drawbars with an 18" diameter wheel. Each drawbar ground requires an average abrasive consumption of about 2 cu. in. Now a wear of 2 cu. in. on an 18" diameter wheel represents a much less reduction in diameter than a wear of an equal amount on a 14" diameter wheel. The more a wheel reduces in diameter for each piece ground, the less its surface speed and the smaller the arc of contact. Unless the correct surface speed is maintained almost absolutely, both of the factors mentioned tend to make the grinding wheel wear out fast and hence lower its efficiency.

Now, these considerations are somewhat theoretical, but sound. They point to the use of as large a diameter grinding wheel as can be employed, taking the type of machine and the strength of the operator into consideration. We should advise the use of at least 18" diameter wheels on the swing frame grinding machines, and larger if within the limits that the machine operators can stand.

Our customers buy wheels for this purpose ranging from 16 to 24" diameter, the majority being 18" and 20" diameter.

**NORTON COMPANY**

Canadian Agents: The Canadian Hardware & Machine Co., Ltd., Montreal.  
Toronto, Ottawa, St. John, N.B., Winnipeg, Calgary, Saskatoon,  
Vancouver, Victoria. F. H. Andrews & Son, Quebec, Que.

Grinding Wheel Plants, Worcester, Mass.

ELECTRIC FURNACE PLANTS  
NIAGARA FALLS, N. Y. CHIPPAWA, ONT.

NEW YORK STORE CHICAGO STORE  
151 CHAMBERS ST. 1110 JEFFERSON ST.



### Forgings, Stampings or Pressed Steel Parts

An attractive catalogue showing the facilities this company has for producing Forgings, Stampings and Pressed Steel Parts—particularly in large quantities—sent on request.

**Dominion Forge & Stamping Co., Ltd.**

WALKERVILLE, ONTARIO

Toronto Office: 206 Excelsior Life Bldg.

## DIAMOND TOOLS FOR TRUEING GRINDING WHEELS



**THE GENERAL SUPPLY COMPANY  
of CANADA, LIMITED**

OTTAWA  
356 Spark St.

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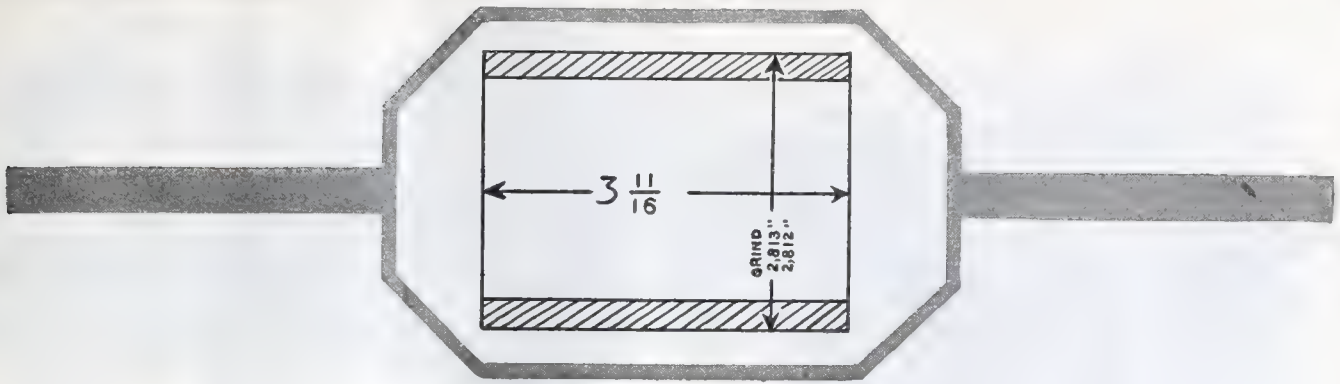
**THE JOYCE-KOEBEL COMPANY, INC.**

Formerly Geo. A. Joyce Co. Ltd.

NEW YORK

LONDON





## Agricultural Machinery Manufacturers! Here's Something for You

The Norton Grinding Company can help you keep down your manufacturing costs, improve the quality and finish of many of your products, and increase the output.

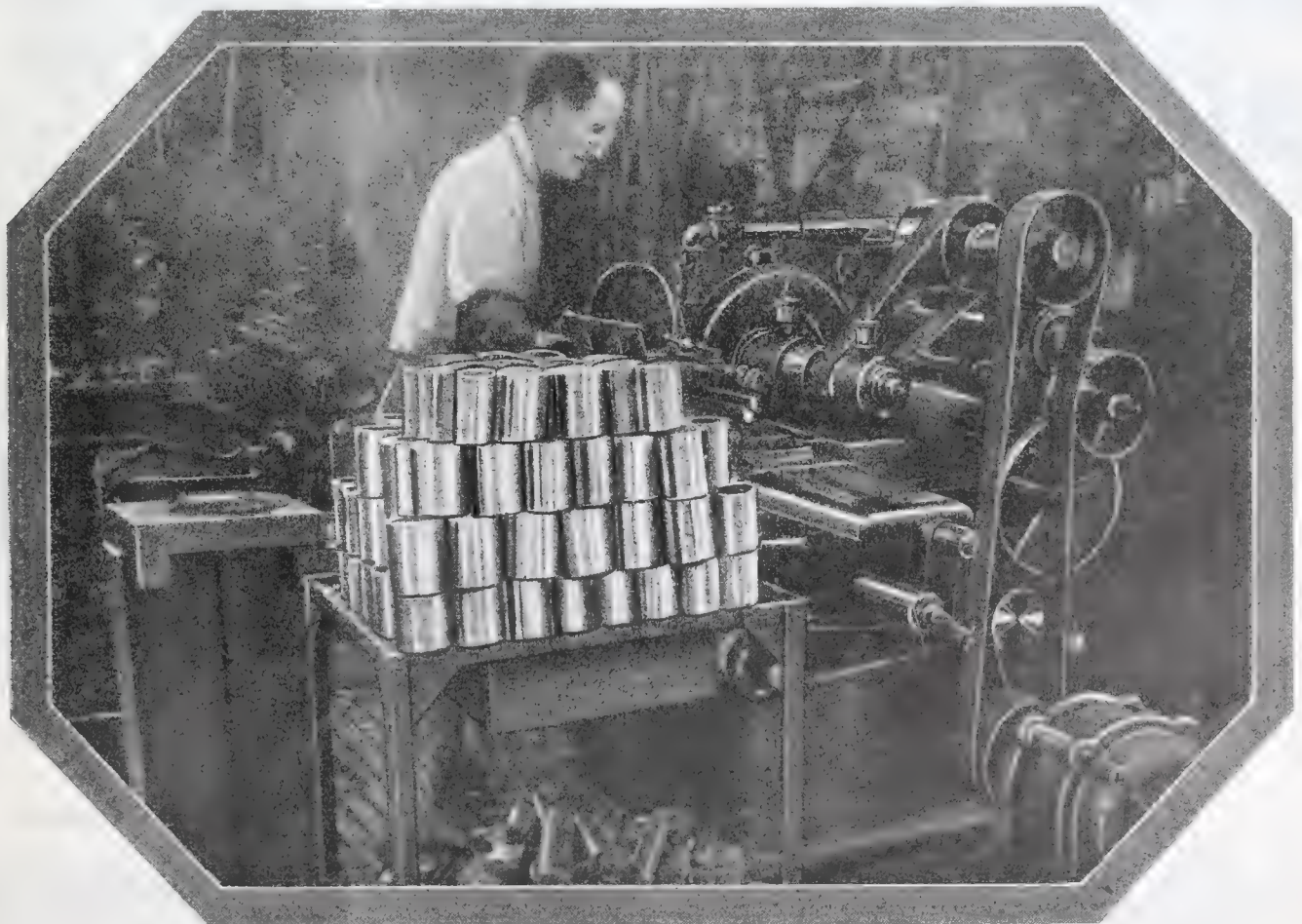
One of the best known agricultural machinery manufacturers uses large numbers of bronze bushings for connecting rods in a large 75-h.p. motor built by them.

This concern finishes them on a 6 x 32-in. Norton Grinding Machine. The operator removes 1-32 inch stock and is allowed a tolerance of 0.001 inch. His average output is one every minute. Our Service Department will gladly furnish you with information on plain grinding. Perhaps you have work that could be done more profitably that way. Send us your blue prints.

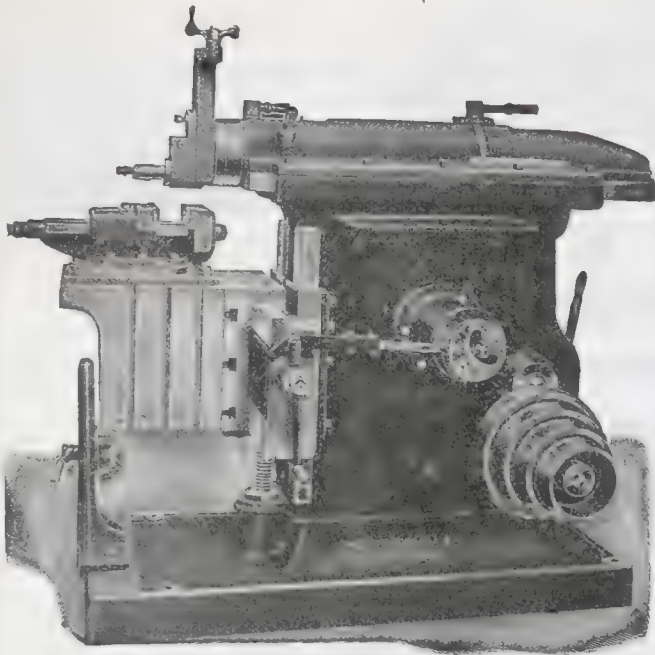
**Norton Grinding Company, Worcester, Mass.**  
**Chicago Store, 11 North Jefferson Street**

**Vonnegut Machinery Company**, Indianapolis, Ind. **Robinson, Cary & Sands Company**, St. Paul and Duluth, Minn. **Manning, Maxwell & Moore, Inc.**, St. Louis, Mo. **Henry Prentiss Co.**, New York, N.Y.; Boston, Mass.; Buffalo, N.Y.; Rochester, N.Y.; Syracuse, N.Y.; Scranton, Penn. **The Motch & Merryweather Machinery Company**, Cleveland, O.; Detroit, Mich.; Pittsburgh, Penn.; Cleveland, O. **Eccles & Smith Company**, San Francisco, Calif.; Los Angeles, Calif.; Portland, Ore. **The**

**Canadian Fairbanks-Morse Company, Ltd.**, Montreal, Que.; Toronto, Ont.; Vancouver, B.C. **C. T. Patterson Company, Ltd.**, New Orleans, La. **Kemp Machinery Company**, Baltimore, Md. **W. E. Shipley Machinery Company**, Philadelphia, Penn. **English Tool & Supply Company**, Kansas City, Mo. **Alfred Herbert, Ltd.**, Coventry, Eng.; Paris, France; Milan, Italy. **The F. W. Horne Company**, Tokio, Japan. **Iznoskoff & Co.**, Petrograd, Moscow and Ekaterinburg.







# McDougall SHAPERS

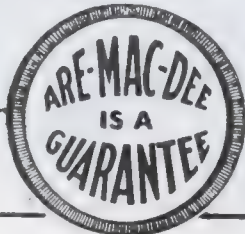
Combine the best features of all machines which have hitherto been placed upon the market, and nothing has been included, except those points which experience has shown to be essential.

An examination of the construction will reveal features that make for increased production, ease of operation and accuracy.

Write for descriptive literature.

**The R. McDougall Company  
Limited**

*Manufacturers*  
GALT, ONTARIO, CANADA



## MATTHEWS Pittsburgh Bevel Steel Letters and Figures

### Hand Made

Matthews' Letters and Figures are hand made from carefully selected tool steel. The characters are neatly formed, producing stamps that make easily read and durable marks on all classes of products. They reduce considerably the cost of high grade marking.

Try them! Mark your next order —  
"MATTHEWS' Letters and Figures."

**CANADIAN FAIRBANKS-MORSE CO., LIMITED**

Montreal, Toronto, St. John, Quebec, Ottawa, Hamilton, Windsor  
Winnipeg, Saskatoon, Calgary, Vancouver, Victoria

**JAS. H MATTHEWS & CO.**

Pittsburgh, Pa.  
Steel Lettering, Dies and Stamps

## Every Emery Wheel With Its Own Dresser



Desirable, isn't it, now that cost is no objection? For with an inexpensive Desmond-Stephan Dresser for every wheel, every wheel will be touched up frequently and so kept true and equal to its original cutting efficiency.



For all ordinary shop grinding wheels specify "Diamo-Carbo" —the perfect diamond substitute.

For large, coarse, hard wheels ask for the "Desmond-Huntingdon."

Sherman Corrugated, 2 sizes  
Norton Zig-Zag, 2 sizes  
Magazine  
Diamonds

The Desmond-Stephan complete line of Economical Grinding Wheel Dressers is catalogued. Write for copy.

**The Canadian Desmond-Stephan Mfg. Company**  
HAMILTON, ONTARIO

Alfred Herbert, Limited, Coventry, Agent for Great Britain



# GISHOLT

## WORKMEN BENEFIT THROUGH THE PERIDOGGRAPH

They are relieved of clerical labor. Each Periodograph time ticket is a voucher for work done. Full credit is given for accomplishment. Work is laid out in advance; no hunting up the foreman when changing jobs. Entire working time given to producing.

The workman is only *one* angle. Let a Gisholt Salesman point out the others.



NO.	42	NAME	Jones
Order No.	264	Operation	Drill
Pr. No.	21		
Name	Bracket		
No. Pcs.			
Pcs. Started	60		
Pcs. Finished	60		
SERIAL ORDERS			
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Test of Periods			
Rate			
Value Cost			
When Stamp			
THIS END			

**GISHOLT MACHINE CO.,**

1207 East Washington Ave.  
MADISON, WIS., U.S.A.

Builders of Standard and Automatic Turret Lathes, Vertical and Horizontal Boring  
Mills, Tool Grinders, Small Tools, Special Machinery, etc.  
Eastern Sales Office: 30 Church St., New York Works: Madison, Wis., Warren, Pa.

CANADIAN AGENTS: The Canadian Fairbanks-Morse Co., Ltd., St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton,  
Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria.

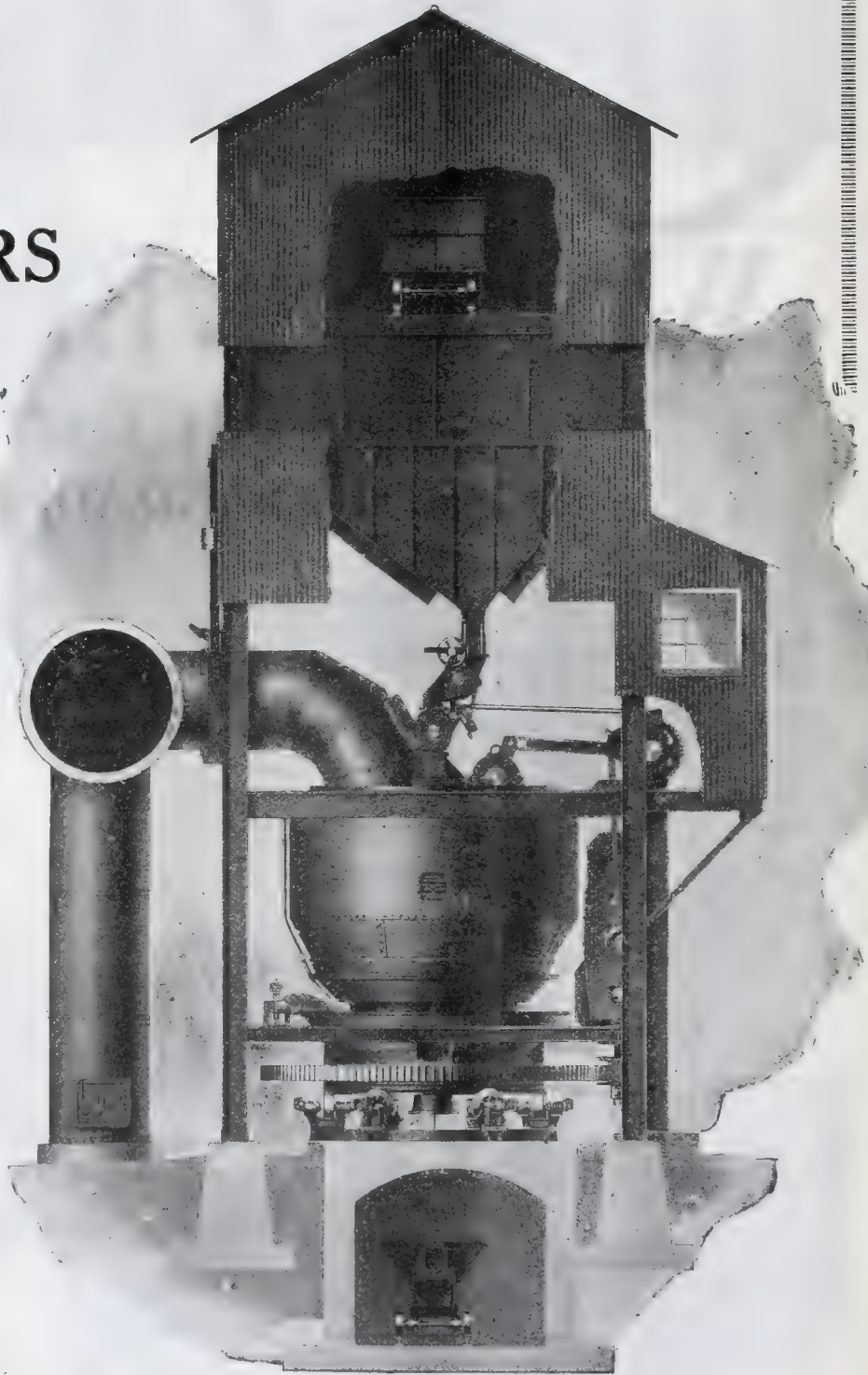


# HUGHES MECHANICAL GAS PRODUCERS

**T**HE Wellman - Seaver-Morgan Company is prepared to install complete producer gas plants—including building, producers, coal and ash-handling equipment, gas flues and valves, or it will supply the gas producer alone.

The W-S-M organization with many years' experience in this line have incorporated in the Hughes Gas Producers correct mechanical principles and excellent materials—resulting in a producer that assures uniformity of performance, low maintenance cost and a minimum labor charge.

A new bulletin giving a detailed description of this producer has just been issued. Shall we mail you a copy?



## THE WELLMAN-SEAVAR-MORGAN CO.

CLEVELAND, OHIO, U.S.A.

THE CANADIAN FAIRBANKS-MORSE CO., LIMITED

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# CANADIAN MACHINERY AND MANUFACTURING NEWS

Volume XXII. No. 8

Toronto, August 21, 1919

## Reducing Press Accidents by Sane Treatment

Through the Courtesy of the National Safety Council We Are  
Able to Present to Our Readers Photographs of Various Safety  
Devices on Presses Which Have Proved Most Successful

**A**CCIDENT records show that more injuries occur on power presses than on any other machine, except, perhaps, the circular saw. This pamphlet will discuss especially the metal-working press, or "punch press," the use of which is so rapidly increasing; but many of the principles herein described can be applied, with a little ingenuity, to similar machines in specialty manufacturing, leather working, printing and binding, soap making, and other industries.

### Causes of Accidents

In practically all press accidents, the operator's fingers are caught under the ram, at the point of operation. This is due to (1) the press repeating, (2) the operator leaving his hand between the dies as the ram descends, or (3) an unexpected stroke caused by accidental tripping.

The report of the Industrial Commission of Wisconsin for the year 1917 shows that of 343 punch press accidents, 333 (or 97 per cent.) occurred at the working point, and that of 111 permanent injuries resulting from these accidents, 110, or over 99 per cent., occurred at this point.

Over 99 per cent. of the cost of these accidents, including compensation and medical attention, was chargeable to accidents occurring at the point of operation. This is convincing proof that to prevent press accidents a study of the operation of each press must be made, to eliminate, if possible, the need of the operator placing his hands between the dies; or, if this is impracticable, to install a guard which will prevent the operator's hands being caught between the dies when the ram descends.

### Automatic Feed

The most effective way to remove the operating point hazard is by using an automatic feed. It is difficult to develop a satisfactory feed for some operations, but if the problem can possibly be solved, a marked increase in production (as well as safety) will result. Types of automatic feed include the following:

(a) Roll Feed. This may be used in most operations where strip metal is passed through the press for blanking. These rolls, driven by small gears, or by

(d) Dial Feed. The work is carried under the descending ram by a revolving dial, fed by hand or by a gravity chute.

(e) Revolving Dies. Two or more dies are constructed on a plate, which revolves at each stroke of the ram. The operator places the work in an empty die; when the die plate revolves it carries the work under the ram.

(f) Sliding Dies. Each operation slides the die from under ram. The operator loads the die, and with the down stroke the loaded die slides back into position.

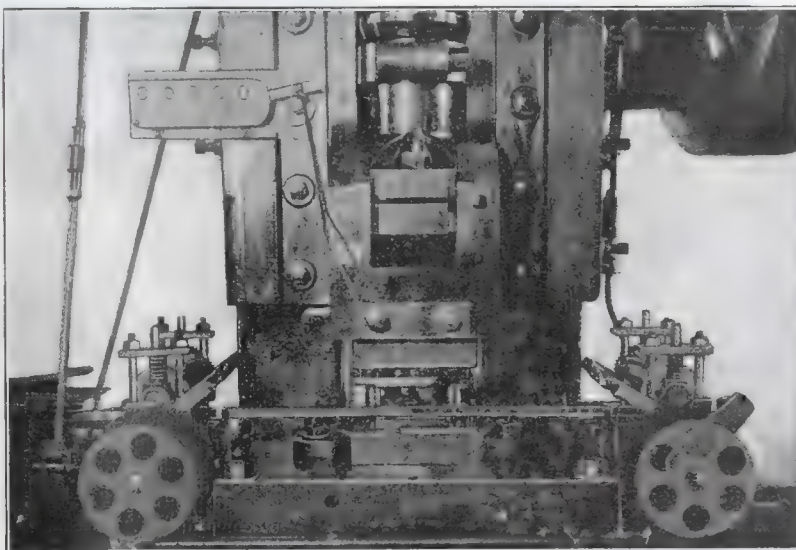
The principal hazards of an automatically fed machine occur when adjustments are being made, or when dies are being changed. If the plunger makes a stroke at such a time a serious injury may occur. Every such machine should be equipped with an automatic stop which will lock the machine whenever continuous operation is interrupted. The plunger and dies should be enclosed, if possible, to remove all danger of operator's hand being caught.

### Blanking

In blanking operations, especially when hand-fed, the plunger should

be enclosed at the front and both sides by a guard of wire mesh, perforated metal or wired glass, leaving just enough space under guard to admit the stock. If of a metal, the guard should contain a slot through which the operator can view his work. For hand feeding, this guard must fit the die closely; it should, therefore, be readjusted, or a separate guard provided, by the die maker or die setter whenever a new operation is put on the machine.

A telescope guard, attached to the ram,



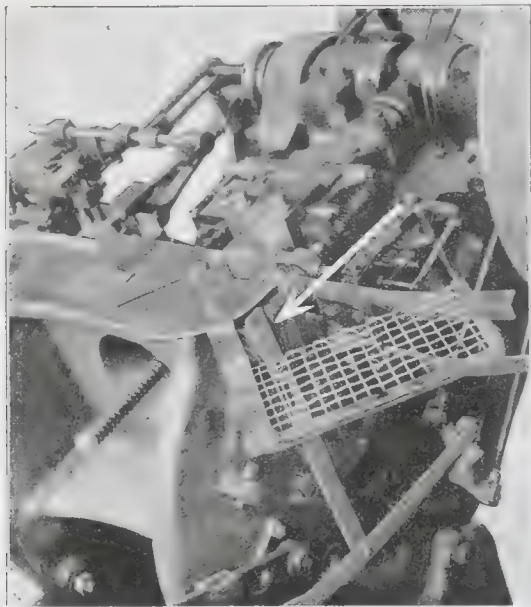
AUTOMATIC ROLL FEED FOR BLANKING FROM STRIP MATERIAL.

a belt, feed the stock through the machine, and the operator's hands need not be placed between the dies.

(b) Plunger Feed. The plunger pushes the work under the ram at each stroke; the operator places the work in a vertical feed chute, the plunger operating at the bottom of the chute.

(c) Chute Feed. The press is inclined; the material is placed in an inclined chute and slides by gravity under the ram.

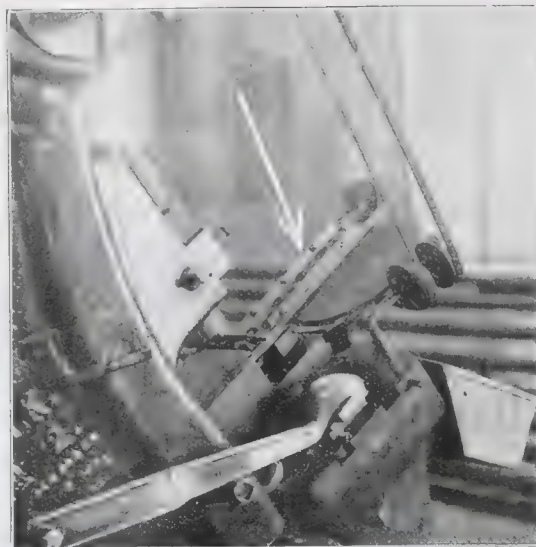




LOCKING DEVICE FOR CLUTCH OPERATING LEVER. NOTE THAT WITH GUARD OUT OF POSITION LEVER IS LOCKED SO THAT PRESS CANNOT BE STARTED.



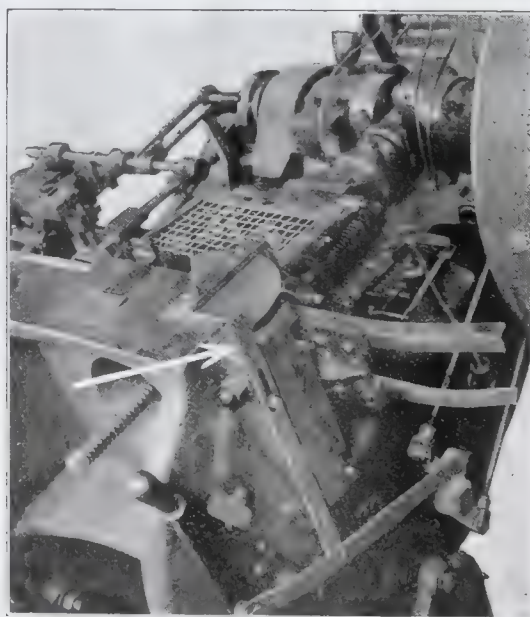
AUTOMATIC PLUNGER FEED.



CHUTE WITH DIAL FEED. MATERIAL IS CARRIED TOWARD THE DIES BY THE REVOLVING DISC.



GRAVITY CHUTE FEED



LOCKING DEVICE FOR CLUTCH OPERATING LEVER. NOTE THAT THE GUARD IS LOCKED IN POSITION BY ROD CONNECTED TO OPERATING LEVER.



is sometimes used in place of a basket enclosure.

In large blanking operations, using long sheets of metal, the operator must ordinarily reach through the machine for the stock, unless a helper is stationed behind the machine. This hazard may be avoided, and the speed of operation increased, by the use of a vacuum pick-up controlled by the operator.

Many of the devices discussed under "Forming" may be used for blanking, but do not furnish as complete protection as a plunger enclosure.

#### Forming

For many forming operations an automatic feed can be devised and the plunger enclosed. With hand feeding, a fixed plunger enclosure is often impracticable. In such cases particular attention should be given to the design of dies, and in addition a device should be provided which will minimize the possibility of the operator's hand being left between dies. Each of the following types has its particular field of usefulness:

(a) A sweep bar or gate, which swings across or moves upward in front of dies, or moves across lower die, as the ram descends, and thus pushes hands out of danger. Such a guard should be operated by movement of ram, not by treadle.

(b) A swinging, sliding, dropping or expanding gate which forms a guard in front of dies before ram descends. This is operated by the treadle. If hand is in danger the gate cannot close and the treadle will not operate.

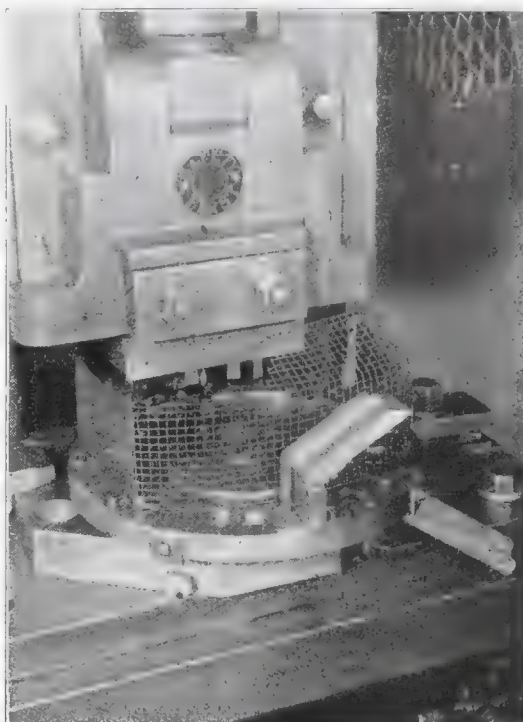
(c) A two-handed lever or push-button device which requires the use of both hands to trip the press or release the foot treadle. Where several men are employed at one large press, an electric control may be arranged with push-buttons in series, so each man must press

are in danger zone. These are not positive in action because they do not remove the hands from between the dies.

(e) Tweezers, picks, air suckers, or

or a kick-out device should be provided. A picker, or compressed air, may also be used to remove the work.

Blanking and forming are sometimes

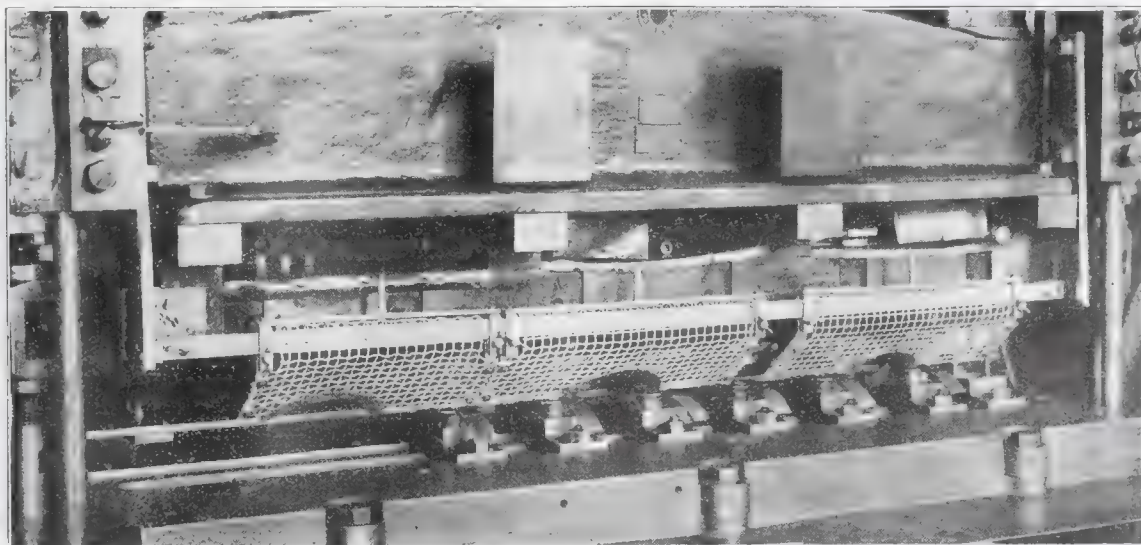


REVOLVING DIES AND CHUTE FEED. PIECES ARE PLACED IN CHUTE, AND DROP INTO DIE, AND ARE CARRIED UNDER PLUNGER BY THE REVOLVING DIE PLATE. PIECES ARE DISCHARGED THROUGH CHUTE SHOWN BELOW PLATE.

electro magnets, with which the material may be placed between the dies. The use of these hand-feeders frequently increases the output as well as decreasing the hazard.

Removing Stock From Press. Many

done in one stroke of the plunger; the cutting die blanks the piece and the forming die completes the operation. This double operation is often dangerous unless special methods are used to decrease the hazard.



GUARD FOR DIES FOR GANG PRESS.

Guards may be adjusted along length of supporting rod. Enough space is left for feeding material, but not enough for fingers to be placed under plungers.

two buttons (one with each hand) before the press will operate.

(d) Tell-tale device which warns the operator of descending ram if his hands

accidents result from workmen's hands being caught while removing stock from press. In many operations the work is liable to adhere to the die, and a stripper

Discipline. Most of the safeguards described in paragraphs 10-12 can easily be put out of use by the operator, or can be wrongly adjusted so they will give

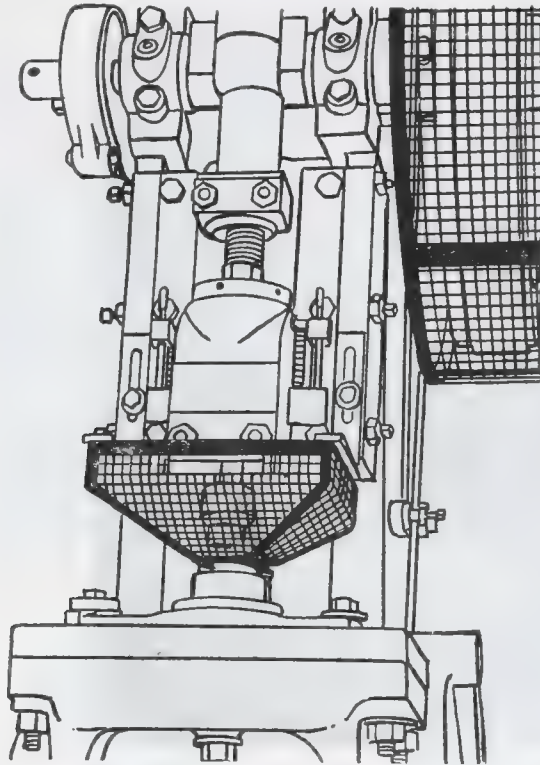


little or no protection. Such types of guards are valueless unless they are kept in proper adjustment and the use of them strictly enforced.

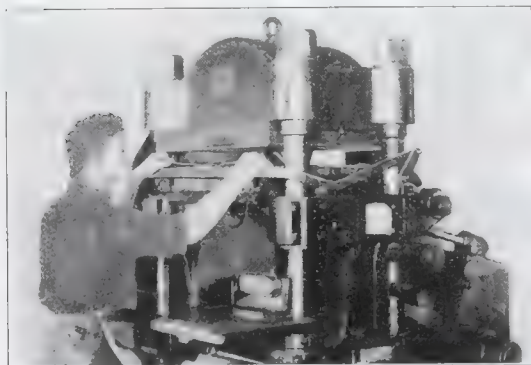
### Die Making

The safeguarding of presses should begin with the design of the dies. As much study should be given to the safety

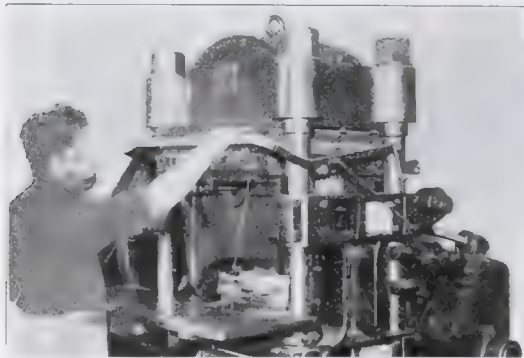
of the operator as to the mechanical efficiency. Safety in press operation can only be secured by keeping the operator's hands out the danger zone. Although mechanical safeguards are designs for that purpose, practically all types of guards may be rendered ineffective by the operator or by error.  
To be continued



BASKET GUARD FOR BLANKING. FRONT AND BOTH SIDES ARE GUARDED. OPENING AT BOTTOM IS JUST LARGE ENOUGH FOR PLUNGER TO PASS THROUGH. THIS GUARD INCREASED PRODUCTION, SCRAP MATERIAL BEING USED.

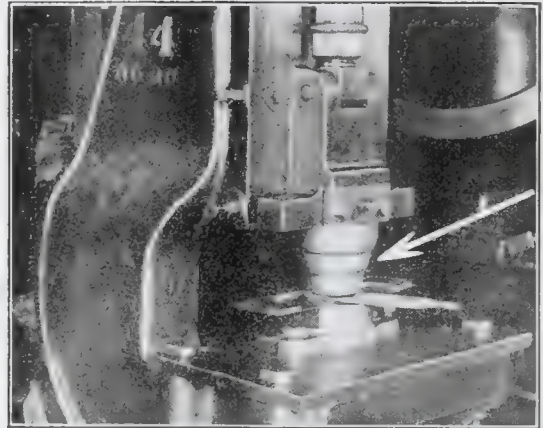


SAFEGUARD FOR STAMPING OR EMBOSSEING PRESS. Guard lies against platen and does not interfere with placing material in press.



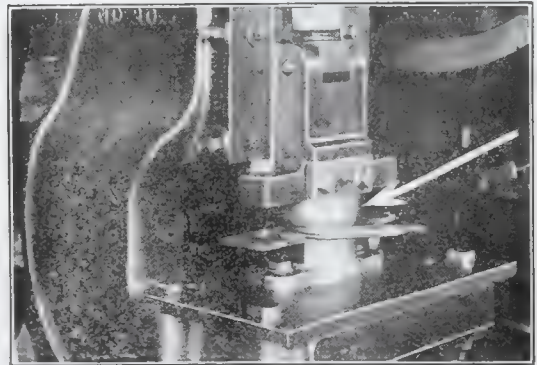
SAFEGUARD FOR STAMPING OR EMBOSSEING PRESS

The upward stroke of platen, by means of two pins and a bell crank, pushes guard upward and outward, thus removing operator's hands from danger zone.

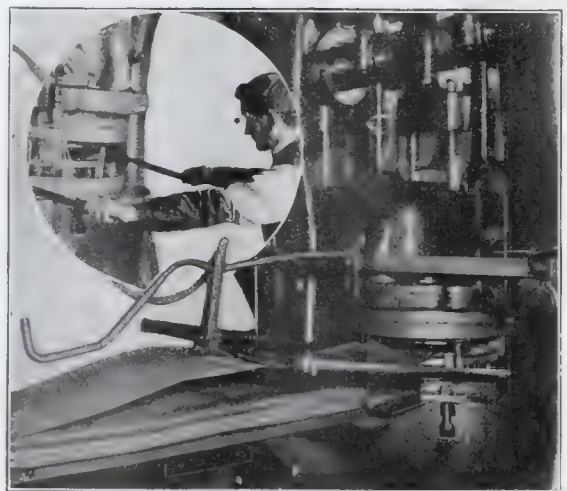


TELESCOPE GUARD.

This guard surrounds plunger and is fastened to head so that as ram descends the parts telescope one within another. At the top of stroke enough space is left for feeding stock, but not for getting fingers under guard.



TELESCOPE GUARD SHOWING RAM AT LOWEST POINT OF STROKE.



SUCTION DEVICE FOR FEEDING HEAVY SHEETS.

Operator at front of machine grasps the handles and pushes the device back on supporting rod until it comes in contact with top sheet of material. When lever controlling air valve (attached to handle) is pressed, the sucker picks up sheet and operator then pulls it toward him. (The large view shows rear of machine, with material in position for first punching.) Operator then grasps sheet by the front corners and continues to feed through machine. The use of this device has done away with need of a helper and has increased production.



# Shop Arithmetic, Simple and Compound Levers

Tenth of a Series in Practical Mathematics for the Mechanic and Those Learning the Machinist Trade—Simple and Compound Levers Met in Every-Day Practice Are Discussed in This Issue

By J. H. RODGERS

**I**F the design and construction of machinery is traced back to its origin it will invariably be found that the elementary principle that predominates is that of the lever, in one or other of its many forms. A brief study of any piece of mechanism will readily prove this assertion. Two other fundamentals might be classed as primary factors—that is, the cord and the wedge—but these two latter are nearly always associated with that of the lever, and could well be considered incidental to the lever principle. The lever in its simplest form might be termed the pioneer machine, as man in his prehistoric state used the limb of a tree as a lever, to move the rock to and from the opening of his cave, to protect him from the perils of the outside world. In the present day the lever in itself retains all the theoretical advantages—no more or no less—that it did in the olden times, but the requirements of modern methods has compelled men to develop it to its highest state of efficiency, so that in many of the intricate mechanisms of to-day, the lever, as a common lever, has practically disappeared, especially to those unable or unwilling to observe the development of the evolution.

The lever is a bar or beam that is capable of turning about a fixed point that is called the fulcrum. The lever, commonly recognized as such, is a straight bar supported at the fulcrum, with the force applied at a relative distance from the weight and the fulcrum, so that the two former are in equilibrium. The principle, however, need not, and as a matter of fact, is not restricted to a straight bar, but may be applied in one of many forms, such as gears, pulleys and arms of any desired shape, but the underlying principles are never altered.

The three factors—apart from the lever itself—that constitute the practical application of the lever, are the fulcrum *F*, the power *P*, and the weight *W*; the position of the former to the latter determining their respective values and the classification of the lever. As there are three factors in the makeup, it follows that there will be three types of levers, and these are shown in the sketch below.



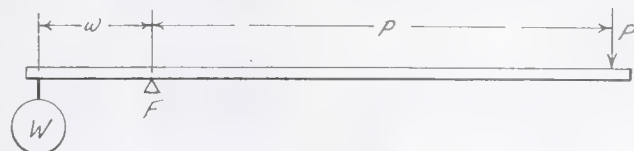
At **A** is shown the first form, where the fulcrum comes between the force applied and the weight supported. At **B** is shown the lever of the second form,

where the weight is supported between the fulcrum and the force applied. The third form is shown at **C**, and here the power acts between the fulcrum and the weight. The classification—weight—that is generally given to any object, is the force of gravity or the attraction of the earth for that body. It is impossible to eliminate this natural force, and it is ever present in all substances, but by means of various devices, its action, apparently, may be suspended, only, however, to be transferred to another body, as the initial attraction still exists, being active through the other medium. For example, suppose a force of 100 lbs. at *P*, in the first form of lever, supports a weight of 100 lbs. at *W*; the weight is

ment of the force and may be determined by multiplying the weight or force by the distance from the fulcrum. Equilibrium is attained when the force moment balances the weight moment. To lift a weight the power moment must be slightly in excess of the weight moment, but this need not be taken into account when calculating such problems in ordinary shop work.

The equation for all lever calculations may be stated as follows: Force multiplied by the force arm equals the weight multiplied by the weight arm. In the expression of a formula and using the letters as shown in the sketch, the equation would be:

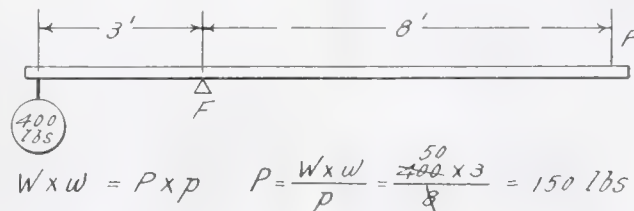
$$P \times p = W \times w$$



temporarily suspended, but the force of gravity still acts through the lever and the fulcrum, with the result that the downward pressure of 200 lbs. is exerted at the fulcrum *F*.

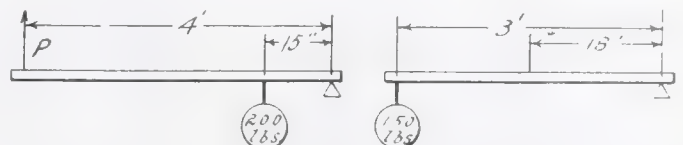
As stated above, the value of the power and the weight is dependent on

A concrete example of the above may be given. Suppose it is desired to support a weight of 400 lbs. at a distance of 3 feet from the fulcrum, and the power arm is 8 feet long, and on the opposite side of the fulcrum; what force would be required?



their relative distance from the fulcrum. In working out problems involving the principle of the lever, the application of ratio and proportion is extensively used.

The solution for the second form of lever is similar to the first, and the advantage is practically the same, the difference being that the force acts in the



$$P = \frac{W \times w}{p} = \frac{200 \times 15}{4 \times 12} = \frac{125}{2} = 62 \frac{1}{2} \text{ lbs}$$

$$P = \frac{W \times w}{p} = \frac{150 \times 3 \times 12}{18} = 300 \text{ lbs}$$

When a weight is supported on a beam or a lever, it always has a tendency to revolve about the point of support or fulcrum; this action is called the mo-

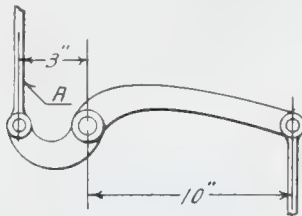
opposite direction to the weight—upwards. In the third form the action is the same as the second, but the mechanical advantage is lessened owing to the



fact that the power applied must be greater than the weight supported. Below are examples of the two latter forms of simple levers.

It will be seen from the above that, when the power acts between the weight and the fulcrum it must be greater than the weight; therefore, for general purposes, the efficiency of such an arrangement must necessarily be considerably less than the levers of the first and second orders.

In the examples that have just been given, only straight beams have been considered, but it is seldom that these ideal conditions will occur in practice, and in many instances it is not advisable that they should. The fundamental principles, however, are the same in every particular; and that is, that calculations for the different moments must be made on the 90 degree basis, where the arm length is taken as the perpendicular distance from the direction of the pull or force applied to the point of support. The principal objects of irregular shaped levers is to avoid interference with other parts of the mechanism when in motion; sometimes the shapes are designed for appearance only.



The above sketch shows a type of lever that is frequently met with in machinery, and in this particular case the primary factor is the movement of the ends to operate slides or valve spindles. In the example here given it is required to find the throw of an eccentric or the lift of a cam, operated on the long arm, to give a vertical movement of 1 1/8 inches to the rod A. To the right is shown a skeleton drawing of the centre lines of the lever, and the arc passed through in making the cycle. To find, by calculation, the required throw, use the principle of proportion as explained in a previous lesson.

$$3 : 10 = 1\frac{1}{8} : x$$

$$x = \frac{10 \times 1\frac{1}{8}}{3} = \frac{10 \times \frac{9}{8}}{3} = \frac{10 \times 11}{3 \times 8} = \frac{55}{12} = 4.58 \text{ in.}$$

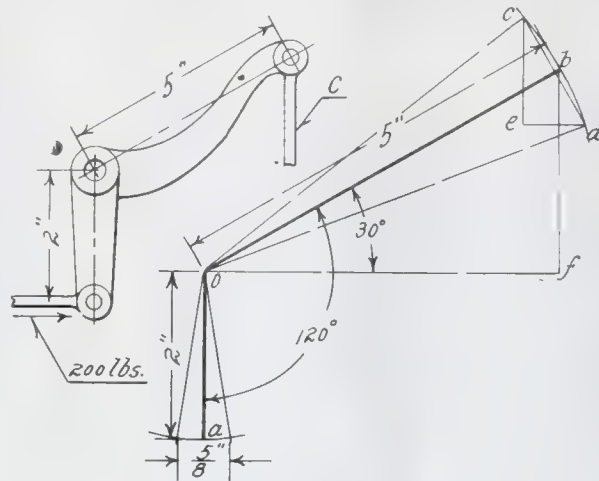
It often happens that a lever may be placed in a position that a direct right angle pull is impossible.

In the sketch shown the rod B is to have a movement of 5/8 of an inch, and is to overcome a resistance of 200 lbs. With the dimensions given, what will be the vertical movement of the rod C, and the force required to overcome the pressure acting at B? The length of the chord c-d, at the extremity of the long arm, can be found by proportion, thus:

$$\frac{5}{8} : c-d = 2 : 5$$

$$c-d = \frac{5 \times 5}{8 \times 2} = \frac{25}{16} = 1\frac{9}{16} \text{ inches.}$$

It will be seen, however, that the upper end of the vertical power rod C will travel through the arc c-b-d, but due to the inclination of the arm at the angle of 30 degrees to the horizontal, the



throw of the crank at the lower end of the rod C will only require to equal the length c-e of the right triangle c-e-d. This length may be found by "trig" and



the rule to apply would be: Side adjacent equals hypotenuse multiplied by cosine, or:

$$\text{Side Adj.} = \text{Hypot.} \times \cos. = c-e = (c-d) \times \cos. 30$$

$$c-e = 1\frac{9}{16} \times .866 = 1.353 \text{ inches.}$$

As b-f is the direction of the power pull the moment for the power arm must be found by multiplying the power applied by the length of the line o-f, perpendicular to the line b-f. This length can be determined by the formula:

$$\text{Side Adj.} = \text{Hypot.} \times \cos. = 5 \times .866 = 4.33 \text{ in.}$$

Then the power required to overcome the resistance of 200 lbs. at the short end of the bell crank would be:

$$2 : 4.33 = x : 200 \text{ or}$$

$$x = \frac{2 \times 200}{4.33} = \frac{400}{4.33} = 92.4 \text{ lbs.}$$

## FORD-SMITH MILLING MACHINES

Unfortunately our composing room dept. made a rather peculiar error on page 10 in advertising section of our Aug. 7th issue.

This referred to the Ford-Smith Machine Co., Ltd., of Hamilton, Canada, who are well known for their line of milling machines.

The advertisement was made to read "Mining Machines" in place of "Milling Machines."

The corrected advertisement appears on page 74 of this issue.

The earliest known mention of cigars is in a book published in 1740 under the title of "Distresses and Adventures of John Cockburn." It appears that Cockburn was cast on a desert island in the Bay of Honduras, from which he swam to the mainland, and thence travelled

afoot to Porto Bello, a distance of 2,600 miles. Here he met some friars, who gave him some "seegars" to smoke. "These," he says, "are some leaves of tobacco rolled up in some manner that serves both as pipe and the tobacco itself." Though this is the earliest date

at which cigars appears to be mentioned by that name, so far back as 1498 two soldiers sent by Christopher Columbus to explore Cuba told their companions on their return how the natives carried in

their mouths a lighted firebrand made from the leaves of a certain herb, rolled up in maize leaves. The description of an Indian method of smoking given by Lionel Wafer, in his "Travels in the Isthmus of Darien," in 1699, shows that they then smoked cigars made just as they are made now.



# A Combination Gas or Electric Blow Torch

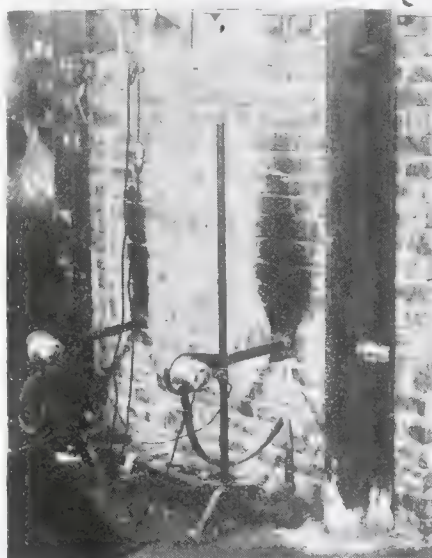
With an Improvised Furnace, of Ordinary Firebrick, You Can Produce the Same Results as With a High Temperature Furnace. That is—if You Use a Torch as Herein Described

By FRANK C. PERKINS

**T**HE accompanying illustration, Fig. 1, and drawings, Figs. 2 and 3, show the operation of a gas-electric blow-torch, developed at Cleveland, O. It is stated that with an improvised furnace of ordinary firebrick, using the gas-electric blow torch, one can produce the same results as with a high temperature furnace—and at only a fraction of the cost. It requires neither engine, compressor, nor any special alteration of equipment. It is self-contained, requiring only connection with the electric light socket and the gas line, to produce a clean, even temperature up to 2,500 degrees Fahrenheit.

It is pointed out that it takes only a minute to put the blow torch into operation as it is only necessary to turn on the current, light the gas, and it is ready. It is instantly adjusted to any position or angle, and it can be carried anywhere in one hand. The cost of operation is only from five to ten cents per hour, and the intense heat produces results in time and money saving almost beyond computation. There is practically no machine shop, blacksmith shop, automobile repair shop, welding shop, or factory where metals are used and heat is required that a gas-electric blow torch cannot be used to advantage. It is convenient, economical, and most satisfactory as a heating equipment for hardening (including high-speed steel), tempering, annealing, forging, brazing, making shrink fits, pre-heating for acetylene welding, babbitting, removing

It is claimed that one of these burners has been developed which is extremely useful for small soldering jobs—for brazing or for heating parts in inaccessible places, and it can be either attached to the regular burner or can be made extremely flexible by using the reducer,



ILLUSTRATING THE IDEA, AND INSTALLATION.

as illustrated, and a short length of hose. The maximum flame length is about 10 inches, the diameter 1½ inches at its largest point. The minimum flame length is three inches, with a diameter of one inch, tapered to a cone. The maximum gas consumption is 52 cubic feet per hour with natural gas, and 70 cubic feet per hour with artificial gas. The minimum gas consumption is 18 cubic feet per hour with natural gas and 25 cubic feet per hour with illuminating gas.

Another blow torch attachment has been designed which gives the same satisfactory results when used for small hardening or melting furnaces. The reason for using this attachment is to prevent the burning of the nozzle when it is inserted into the furnace. Gas is protected into the furnace and does not burn on end of nozzle. Changing from the blow torch to the furnace burner can be done in a moment by simply slipping the one off and the other on.

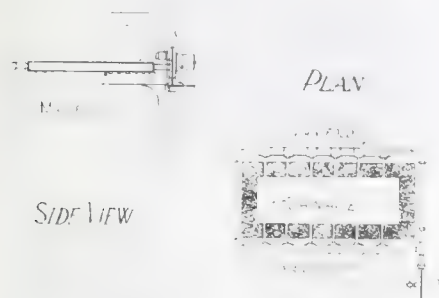
The oil-electric blow torch operates with the same high efficiency as the gas-electric torch, the only difference being its ability to burn kerosene. This oil-electric blow torch is fitted with a specially designed kerosene oil burner. This burner operates on the atomizing

principle, but is also fitted with a vaporizing coil to gasify the fuel after the burner has been in operation long enough to heat the coil.

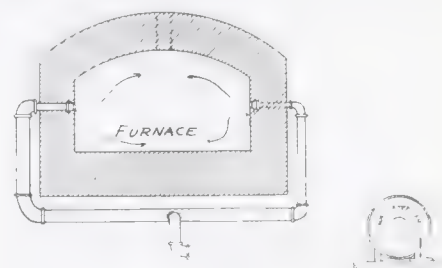
The particular feature of the oil-electric blow torch is that it will light instantly without pre-heating. It produces a clear luminous flame of approximately the same temperature as the gas-electric torch. Its range of control is excellent—furnishing a maximum flame length of about 24 inches with a diameter of 5 inches at its largest point.

The electric blow torch will also burn either natural or artificial gas successfully and is fitted with a gas control cock the same as the gas-electric. Thus this torch is really universal. It can be used in the city for the many heating and repairing jobs to which it is adaptable, and it can be easily transported to the country or to any district where there is no gas, and used with oil. The maximum kerosene oil consumption of the oil-electric blow torch is approximately 2½ gallons per hour—the minimum 1½ gallons per hour.

The gas-electric blow torch has a blower of extremely substantial construction, which will operate continuously for practically any length of time, due to the fact that over-heating of the motor is absolutely prevented by the air entering the blower which must first pass around the motor before entering the fan chamber. The gas enters through the opposite side, and the mixture of air and gas is made perfect by



OTHER VIEWS OF FURNACE.



SECTION THROUGH FURNACE.

babbit from bearings, melting various metals, also for making pattern castings, straightening bars, shafts, frames, axles, crank shafts in centre, and bending tubing and heating rivets.

It is used to advantage for hard soldering, fitting boiler patches, skin drying, molds, heating core ovens, repairing tools, drying cores, repairing patterns gates, riveting frames, housings and spindles, also for removing old insulations from stators, armatures and soldering large commutators, removing pulleys.

the rapidly-revolving fan. When the mixture leaves the fan chamber it is a perfectly homogeneous mixture of air and gas of the most combustible nature. Both the volume of air entering the blower housing and the supply of gas is under instant control. The motor is entirely enclosed to prevent dirt or dust getting in contact with the bearings and other moving parts, and the constant cooling blast of air keeps it in perfect running condition.



# The Various Mechanical Properties of Steel

Taking Up the Consideration of the Question of Brittleness, Together With Investigation of Failures of Various Kinds. A Paper of This Nature on Steel is Especially Valuable at the Present Time

By W. H. HATFIELD, D. Met. of the Brown-Firth Research Laboratory, Sheffield, Associate Member  
(Continued from last issue)

**I**N a recent paper previously referred to, Rosenhain and Hanson describe an investigation into the cause of cracking in a thick boiler plate. The failure examined occurred in the last stage of manufacture, that is, cracking during cold bending. The authors present interesting data, and the results of subsidiary experiments bearing upon the case. They deduce that the cause of failure lay in the growth of large crystals in the ferritic bands, claiming such crystalline growth to be responsible for the low impact value of the material, and that the low impact value of the material was an indication of the mechanical properties which produced failure. The processes through which this particular plate had passed were those through which other plates had passed which had not cracked, and the author's conclusions would have been more convincing if they had definitely shown that successful plates had not possessed the same features which they condemned in

subsequently smashed into a number of pieces, causing the well-known disaster. One eminent investigator states that thousands of rails of worse composition had served satisfactorily. The mechanical properties, as shown by the tensile tests, were good. One extremely important feature, however, seems to be that the upper surface of the rail consisted in many parts of a martensitic layer (layer of hardened steel). This layer contained thousands of hair cracks. Such a martensitic layer may conceivably have been produced by abnormal effect of the brakes, and such a layer would yield the minute cracks just described under subsequent usage. The main points that it is wished to record are:

1. The original satisfactory condition of the rail as proved by the satisfactory behaviour over 22 years.
2. Its mechanical condition.
3. The presence of surface cracks.

Leaving this case for the present it is proposed to describe an interesting case

low-carbon structural steel. That discovery, in itself, as will be appreciated, was quite an important one when present circumstances are considered. The figures obtained in the analysis were as follows:

	Per Cent.
Carbon .....	0.09
Manganese .....	0.65
Silicon .....	0.017
Sulphur .....	0.038
Phosphorus .....	0.061
Tungsten .....	Nil
Chromium .....	Nil
Nickel .....	Nil
Vanadium .....	Nil
Titanium .....	Nil

Microsections were prepared and the microstructure of the steel studied. In Fig. 2 will be found a photograph of the unetched structure which gives an idea of the amount of non-metallic inclusions present. There is, of course, always more or less of this non-metallic matter

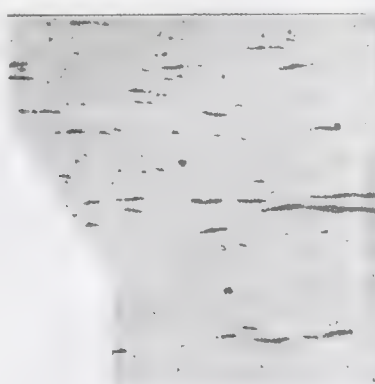


FIG. 2 UNETCHED  $\times 100$  DIAM.

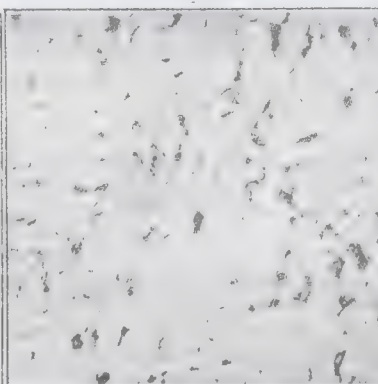


FIG. 3  $\times 100$  DIAM. ETCHED.

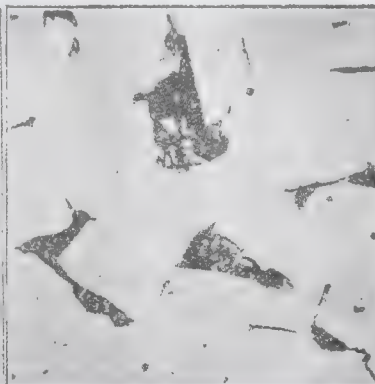


FIG. 4  $\times 500$  DIAM.

the plate which had failed. One would rather suspect that the breakage of this plate was due to the presence of mechanical defects or the production of small incipient flaws by over-bending in the cold. Unfortunately, the stages of bending are not published. The author discusses this paper now, since it has a direct bearing upon the technical points which he hopes to bring forward later.

Another well-investigated failure is that of the St. Neots rail. This failure was the subject of a Board of Trade Inquiry. It has also been dealt with by Dr. Arnold, F.R.S.; Dr. Stead, F.R.S., and others. Here we have an extremely valuable instance of a failure with many well-authenticated details. The rail was 22 years old, and it had worn down 5-16 in. under traffic abrasion; it then

which recently came to the author for investigation. He was informed of a case in which a piece of structural steel (angle-iron) made from shell discard, had broken sharply in two with a blow from a 14-lb. hammer. The fracture is illustrated in Fig. 1, page . He was incidentally informed that this occurrence had raised grave doubts in the minds of the firm concerned with regard to the advisability of the extended use of such material. In due course the pieces came into his hands, and an investigation was entered into with considerable enthusiasm, as here indeed was apparently an instance of really brittle steel. In the first place the chemical composition of the material was determined, and it was immediately found that the steel was not shell discard but

in these structural steels, and its layout is always parallel to the direction of rolling; hence in this particular instance the inclusions were in path at right angles to the fracture. In Fig. 3 will be found the etched structure at 100 diameters and the amount of pearlite, together with the size of crystal, can be studied. In Fig. 4 will be found the microstructure of the material at 500 diameters, and this particular photomicrograph enables the condition of the pearlite to be examined. The author did not consider that the micro-examination brought out anything abnormal, but found that it confirmed the results of analysis.

The mechanical properties of the material were next studied in proximity to the fracture. The tensile values, includ-



ing the elastic limit (limit of proportionality) were determined, and then the different values were obtained under the Arnold, Charpy, Izod, Fremont, Sankey, and Stanton tests. The hardness was determined by both the Brinell and Shore methods; the results will be found in the following table, whilst the full details of the actual tests will be found in Appendix I:

Tensile—	
Elastic limit .....	15.9
Yield-point .....	20.9
Maximum stress .....	29.4
Elongation of area .....	30.0
Reduction of area .....	61.9
Alternating Impact, etc.—	
Arnold alternating-stress test .....	211 reversals.
Charpy impact test .....	2.9 kpm. or 20 ft.-lb.
Izod .....	50 ft.-lb.
Fremont .....	23 kpm. 90 deg.
Sankey Alternating-bend test .....	33 bends 2,320 ft.-lb.
Stanton repeated-blow test .....	635
Hardness .....	
Brinell hardness number..	120
Shore Scleroscope number.	20.5

It is considered that these values are of much interest. In the first place, the Arnold and Sankey tests give too good values for the steel to be considered brittle. The Charpy, Izod, and Fremont gives values which must be considered very good, therefore the steel is not brittle under the notched-bar tests. For 28 tons to 32 tons steel the tensile values must be considered quite satisfactory. Why, therefore, should this angle-iron of good composition, microstructure, and mechanical tests break with a single blow from a 14-lb. hammer? The explanation appeared to be forthcoming as a result of a careful examination of the fracture. At the point marked by the arrow there was a discoloration indicating a sharp, already-existing crack of small area. The author considers that this crack led to an undue concentration of stress, and that, in spite of the good qualities of the material, fracture extended right through the piece in the manner described. Continued observations, both in this country and abroad, have readily and finally established that the sharpness of a notch or the gradually decreasing value of the radius at the bottom of the notch, accentuates its effect in reducing the amount of energy absorbed in destroying an impact test-piece. It is now firmly established that the stresses become increasingly great locally to a notch according to its sharpness. Professor Hopkinson, in one of his papers has observed quite truly that if the bottom of the notch or crack were infinitely sharp, this concentration of stress would cause the production by a small force of a high local stress at the base of a notch or crack sufficient to exceed the strength of the material and cause a continued propagation and development of fracture. In other words, failure such as occurred in this piece of structural steel, in some of the cases of boiler plate failures and, in the author's opinion, in the St. Neots rail, have been due to existing cracks of considerable "sharpness," which have, by their creation of unduly high local stress, exaggerated abnormally the work which the

material was locally called upon to do. Impact values may vary considerably in a given steel, but a high impact steel as already shown, is not impervious to disastrous failure under conditions such as those just discussed.

It will be noted in the case of this piece of structural steel just described that the Stanton value is low. In a 60-tons tensile steel values of 6,000 to 8,000 blows are obtained. In this particular instance the energy of blow was exactly the same, and the low value is explained by the low elastic limit. It will be observed that this low value (Stanton) was obtained in spite of a high notched-test value. The general argument for the utility of the notched impact (single-blow) test usually relies on the claim that through inadvertence or design, sharp corners, notches, defects, even cracks have to be counted under actual service conditions.

Surveying notched-bar, impact and "fatigue" tests generally, the author

the providing of a sufficient factor of safety in relation to elastic range.

#### A Discussion of the Methods Employed

##### For Mechanical Testing

As regards the tests now in use for the mechanical testing of steels and irons, it may be safely said that each provides information of value. This may be stated without excepting any individual test. How are we to judge the relative value of the diverse means of testing from the engineers' point of view? It would appear that those tests are most instructive concerning the ultimate behaviour of the steel, which nearest approximate to, or reproduce, the conditions under which the steel has to serve. The tensile and torsion tests are of particular value, and in most cases clearly give a direct indication as to the suitability of the material. Particularly useful for purposes of design is a more complete knowledge of the elastic range under these two forms of test. Until more ready means

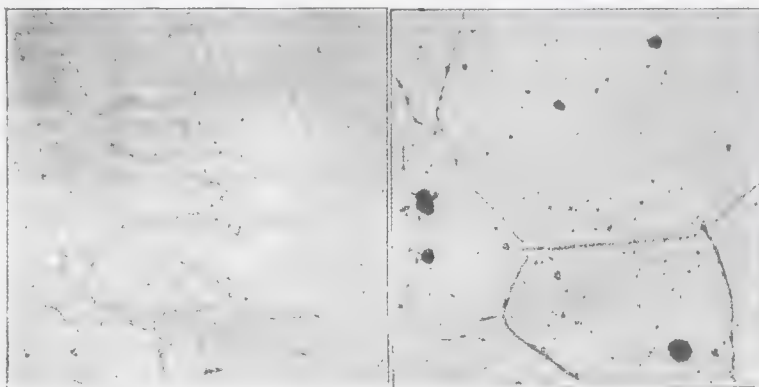


FIG. 6. WROUGHT IRON AS RECEIVED  $\times 100$  DIAM. ETCHED  $\times 500$  DIAM.

considers that one definite fact is apparent, namely, fatigue tests with notches, such as the Stanton test, do not show any relationship to the impact values. For instance, two high-tension steels of a suitable elastic limit otherwise identical, one giving 50 ft.-lb. under the Izod, whilst another gives 8 ft.-lb., will be found not to show any disparity under Stanton test, both breaking under that form of test at something like 7,000 blows. As an instance of actual observations made, the diagram shown in Fig. 5 is instructive. There will be found the results of tests on six 60 tons to 65 tons steels. The full tensile values, together with the Stanton, Izod and Charpy values were obtained. It is clear that everything else being equal, the incipient cracking prior to rupture of the material occurring at the notch of the Stanton test-piece should, on the above argument, have been prevented from developing by the high impact value of the material, thus providing a discrimination. To the author's mind it would appear that the inference to be drawn from this and other data which will be provided later, is that once the elastic range has been passed, final rupture cannot be prevented by variations in impact value. Hence arises the fundamental importance of thoroughly considering the distribution of stress and

of determining the limit of proportionality in the tensile test than the present-day extensometer can be obtained, such determinations cannot become routine tests, but the engineer might usefully obtain sufficient number of such readings to assist him in more accurately calculating his safe ranges of stress.

As regards the tensile test we have much to learn, and investigations such as those which have of late been pursued by Professor Dalby, F.R.S., are invaluable. He and other workers have advantageously shown the value of the detailed study of even our most commonly employed tests.

(To be continued)

In the slang of the United States, a "dago" is any dark-skinned foreigner from Southern Europe or Spanish America, especially an Italian, a Spaniard, or a Portuguese. In his "Life of Commodore Perry" (the American naval officer who opened Japan to commerce in 1852), Dr. William Eliot Griffis says: "In Spanish America 'Santiago,' 'San Diego,' 'Iago,' and 'Diego,' are such frequently recurring vocables that the Yankee sailors call natives of these countries 'Dago men,' or 'Diegos.'"





## WHAT OUR READERS THINK AND DO



### When is a Parting Tool Not a Parting Tool?

On July 17th We Published Mr. Ernest's Views on the Subject of Parting Tools. Here Are Two More, With Still More to Follow. Have You Sent in Your Idea Yet?

#### CUTTING-OFF IDEAS

Of S. G. Macklin

Regarding cutting-off tool discussion, I wish to continue where Mr. Ernest left off.

Having called your attention to the importance of a level bottom to the tool and proper side and end clearances, which have been well determined and can be obtained from any chart, let me suggest that the top rake and cutting edge can be made to suit various conditions.

The tool as made by the tool grinder is usually left level and square on the top.

Now, any tool which has been used a long time turning high carbon steel will have a little pit behind the cutting edge, proving that the flow of metal is decidedly tangent to the diameter. Now, this square cutting edge is on the same plane as a horizontal centre line, whereas the flow of metal being tangent must be so to a perpendicular one.

To accommodate this condition is the first consideration, for it is evident that the metal will pile up on the tool until there is sufficient pressure to compel it to change its direction of travel. The conclusion we have now reached being that we must grind a slight curve as our means of creating favorable conditions.

Observation of this one point will be the best guide.

We now have a tool that will offer the least resistance to the metal, and if we can insure the chip being of less width than the groove we wish it to pass out of, we can cut for months and not worry much.

When the metal meets the resistance of the tool there is as great a tendency to overcome this resistance sideways as endways. I mean that the chip has a natural tendency to spread.

We will grind our tool, not square across the end, but ever so slightly rounding. This gives the chip a natural tendency to curl its edges and make it narrower than the space cut.

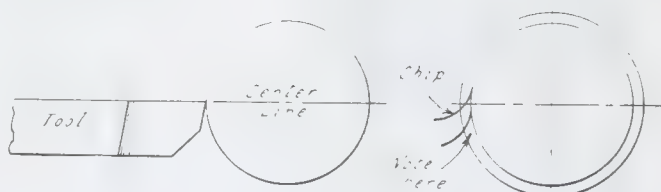
It is this one thing more than any other that makes the difference between

a good tool and another one on the same piece of stock.

Many young fellows who think that cutting off stock is an art, that one has to be born with the know-how and so on, will realize that after many tries and careful grindings the cut-off tool got their goat, and with their patience all gone and a feeling of madness and despair, they grind again with a to-hell-

If it is not so the metal on the sides of the cut will pinch and bind just as a board does on a rip saw.

But there are ways of using and keeping such a tool. The ideal cutting-off tool is the forged one with clearance below the top face and its clearance behind the point. Unfortunately this makes a weaker section where the stress is greatest. And workmen are prone to



S. G. MACKLIN'S IDEAS.

with-it feeling, and the thing worked fine.

I offer this last as a suggestion that it is not the swearing that helps the job, but the ever so slightly rounding cutting edge.

The proof of these theories can be found in every-day practice.

#### CUTTING-OFF TOOL DISCUSSION

By Donald A. Hampson

The point that any cutting-off tool or parting tool must be wider at the extreme end than back of it is well taken.

grind this forged tool on the top face, so that very soon it ceases to be the thing we so proudly forged, and gets shoved aside, the workmen meanwhile hunting for a better tool and growling about the "poor tools they have in this shop." It is difficult to reforge a tool so misused. The best way is to cut off the remaining part of the blade entirely and begin anew. The writer likes such forged tools and has been able to get the maximum of life from them when used personally, although the cost of the forged tool is almost as great as the inserted blade type, but prefers the latter style for all-round shop use.



A careful observer will have noticed that any tool cuts small when dull, and practically all tools will cut a path slightly in excess of their own width when sharp. So it is with the parting tool. If the edge is dull, and particularly if the two corners get worn a bit, the tool will pinch and tear. More frequent touching on the front and less heavy grinding after it gets dull will be far better for the work. As it is hard to keep up the sharp corners in everyday

keeping a sharp front edge and by cleaning the sides of the blade of the scale and black from hardening. Another advantage of this kind of tool is that almost any poor fist of a workman can sharpen it.

Poorly fitted and badly worn surfaces on the lathe are a source of trouble, but a free-cutting tool will make them less troublesome. Oil or compound of steel should be applied so it reaches the cutting edge; a drop there is better than a

Very often a parting tool is used full depth on a job that has a portion of the cut turned away afterwards. A better way is to do the other work first (as for instance, chamfering the heads of two bolts made together) and then cut off with the blade through the short section, avoiding the long cut and the tendency to rub on the sides.

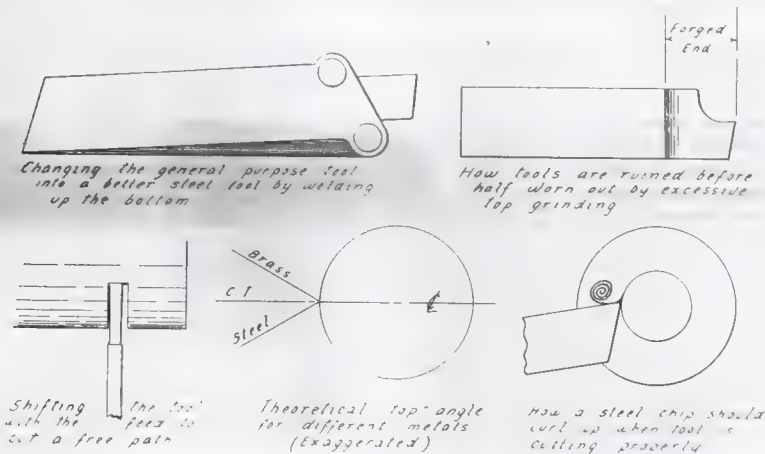
Much of the trouble with such tools comes from not being properly set. They must be set with sides parallel to the cross feed or with equal side clearance to prevent crowding to one side with the attending crooked cut and broken blade.

Eggs are reported to be selling in some Russian cities at the equivalent of \$5.10 apiece in currency. Russian currency is made by the process of running slips of paper through a printing machine. A good egg should be worth a lot of it.

After a survey of conditions the country over, the National Industrial Conference Board announced that the cost of living for American wage earners was 71 per cent. higher in July, 1919, than at the outbreak of the world war in July, 1914. This was said to represent an advance of 6 per cent. since March, 1919, and of 12 per cent. since June, 1918. The increase of 71 per cent. since July, 1914, compared with an increase of 61.3 per cent. up to March, 1919, of 65.9 per cent. up to November, 1918, and of 52.3 per cent. up to June, 1918. The total increase for the five years' period on food was 85 per cent.; shelter, 28 per cent.; clothing, 100 per cent.; fuel, heat and light, 57 per cent.

For hundreds of years Mexican Indians had a horror of what they called the pest spot of Lake Chapala, near the shore at Tizapan, say the "New York Evening Post." They would not bathe in it or sail around it, declaring that the water was oily. Then, after a time, they cautiously began to paint their wooden boats with this oil, which proved so effective in keeping out the water that it became the general custom to use it. They did not know that this was petroleum gushing up through the water—a magnificent flow, about two miles out in the lake, which to this day gushes apparently without varying. When the water is low, petroleum floats in solid masses, each large globe weighing about twenty-five pounds.

Paris fashion reports tell of dresses in kid such as gloves are made of, and of trimmings of kid and patent leather on all sorts of outer garments. Leather being so scarce in Europe that boots and shoes have reached unprecedentedly high prices, it is to be requisitioned for other articles of dress also. That is the way of fashions. When leather is very plentiful again it will vanish from the costumes, and cloth-topped boots and whole cloth shoes will be in favor. It is a paradox.



DONALD H. HAMPSON'S IDEAS

hustle, some men grind them off into a 45 degree bevel of about a sixty-fourth in length. This seems to work well.

Much of the work that is cut off has to be faced again or the end surface does not have to be particular anyway. A trick that will speed up this work remarkably is to cut a swath say a thirty-second wider than the tool by moving the carriage back and forth that much as the feeding-in takes place. This keeps a clearance on the tool at all times and permits a much higher rate of feeding. Moreover, the sides of the cut will look fully as good as the one where the tool got stuck and broke once or twice. This simple trick was passed along to the writer in Uncle Sam's country a number of years ago, by "a man from Canada," and it has been worth money to know it.

Many men make a mistake by over-feeding at the start. On a job of large diameter or a rough casting, they shove the tool in so hard or else have the lathe running so fast that the edge goes off on the first revolution. Thereafter they have trouble with the tool and consider themselves lucky if they get through the piece without a break. If the scale had first been ground off or cut away with another tool the cut would have been started correctly and under no handicap. A slower speed with patience is usually the "make haste slowly" of cutting off.

With tools of the Armstrong variety, the forging expense is entirely avoided and a well-shaped tool provided at the start. Mr. Ernest's trick of swelling the end of the blade to make a wider cut is good but the writer has seldom seen blades soft enough to do this. It will be found, however, that the necessary clearance is provided in most cases by

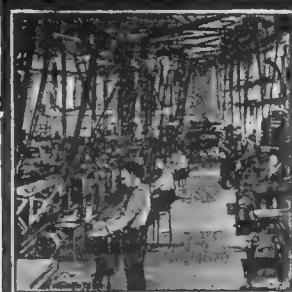
can spilled over the lathe, and then with a sharp tool, properly set, the chips will curl out with that peculiar hiss so welcome to the machinist.

Causes of tool breakage, other than already mentioned, are too much clearance on the front of the tool (which takes away the bearing and allows the tool to feed in too easily and too fast) and lack of rake on the top surface (which makes the tool grind and push the metal off instead of shearing it). True, the top of the tool may be ground at an angle forming a "lip," but as mentioned with the forged tool, this soon makes a great deal more grinding necessary or the reshaping of the tool.

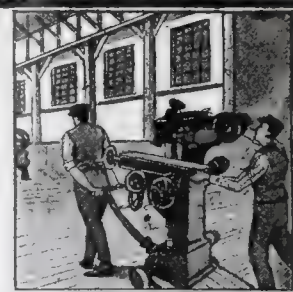
The writer has bettered the standard tool holders in this respect by welding up the bottom full from heel to the screw boss. By so doing the blade is permanently fixed at an angle of about 7 deg. and an improved cutter for steel is thus arranged. It works well on cast iron, too.

Before hardening forged tools they should be set up on a planed surface and checked for clearance from the top down. If they don't show up correct in such a test with a square they should be ground or cut off in the shaper until they do. And a test for decreasing thickness back of the point should be made. It is often easier to correct defects here by filing than to do it with the wheel after the tool is hard.

A good way to ease up on the cutting-off tool on deep work follows. Suppose the cut is 2 in. deep; then, instead of setting the blade out two inches from the holder set it only one inch and cut that much with the stronger, stiffer tool. Set the tool out another half inch and cut that far. Finally cut the last half inch only with the weak tool.



## DEVELOPMENTS IN SHOP EQUIPMENT



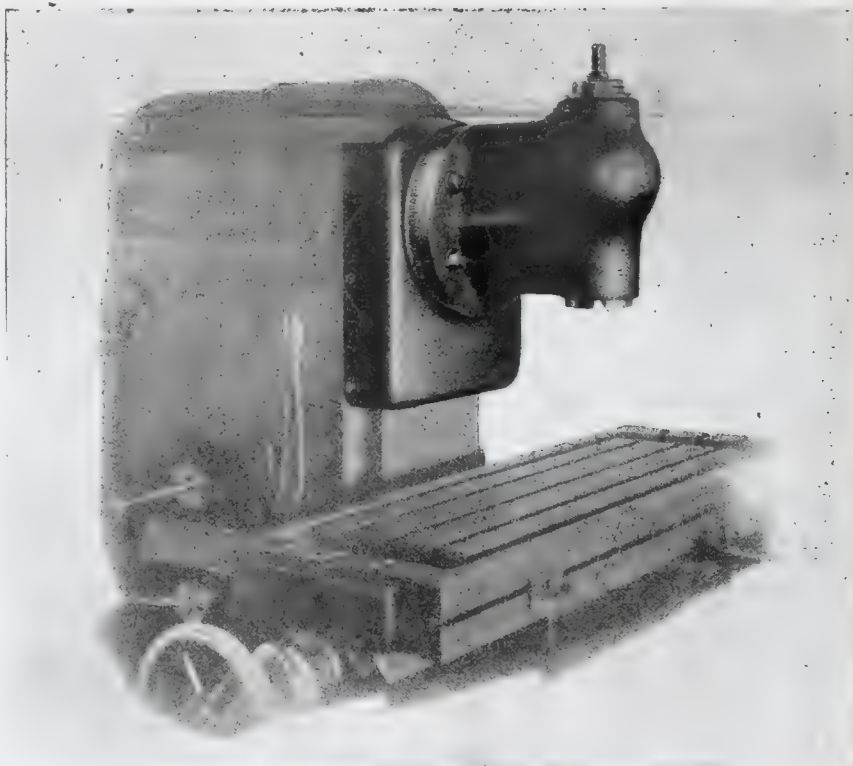
### VERTICAL SPINDLE MILLING ATTACHMENT

Every machine shop at sometime or other has work that can be more advantageously performed with a face mill on a vertical spindle. To meet the demand of those who cannot keep a vertical milling machine busy, there is always the vertical spindle attachment, which will give the range of a vertical milling machine on ordinary classes of vertical milling work.

The Cleveland Milling Machine Co., of Cleveland, Ohio, have developed a fixture of this nature, and a glance at the illustration will serve to show its general construction.

This attachment is of very rigid construction and capable of milling up to the capacity of the machine and is easily mounted on the face of the column.

The drive is taken from a gear fastened to the nose of the spindle, which in turn drives the spur gear on the horizontal shaft and the spindle is in turn driven by large mitre gears. All gears and shafts are made of steel and enclosed, running in bronze bearings throughout. The bearings on the spindle are the same as the milling machine spindle and form two taper cones in opposite directions adjusted by a nut on the outside of the spindle. The base of the head is graduated so that it may be set at any angle in a vertical plane parallel with the elevating screw. The distance from the face of the column to the vertical spindle and the distance from the nose of the spindle to the top of the table in the highest and lowest position covers the range of the ordinary vertical spindle milling machine. This attachment, when clamped in position on the dovetail slide of the column which extends above the centre line of the spindle, is as rigid as if it were a part of the milling machine.



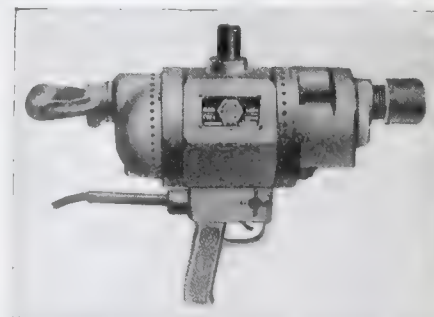
CLOSE UP VIEW OF THE ATTACHMENT.

illustration, and has a capacity up to 9-16 in. in steel, and is provided with a No. 1 Morse taper socket. It is stated the machine will drill a 9-16-in. hole through machine steel at rate of  $1\frac{1}{2}$  in. per min. without overloading the motor. The housing is of Magnalite, an aluminum alloy. The gears are packed in grease in a separate grease-tight compartment, and the drill spindle runs in a long bronze bushing, thrust being taken by a ball-thrust bearing. The motor is air cooled

from the spindle. The drill shank protrudes slightly beyond the end of the taper socket, in order that the drill may be removed. This construction is used, for if it was necessary to leave room for the drift-pin slot the machine would be considerably less compact, and the end of the spindle would be some distance from

#### GENERAL SPECIFICATIONS

	No. 1	No. 2	No. 3
Distance from Face of Column to center of Vertical Spindle...	10 $\frac{3}{4}$ "	12 $\frac{1}{2}$ "	15"
Distance Nose of Spindle to Table—			
Highest position .....	11"	11 $\frac{1}{2}$ "	2"
Lowest position .....	16 $\frac{1}{2}$ "	16 $\frac{1}{2}$ "	18 $\frac{1}{2}$ "
Cross Range of Machine .....	8"	10"	12"
Longitudinal Range of Machine .....	22"	28"	34"
Taper Hole in Spindle .....	No. 10 B.&S. No. 11 B.&S. No. 12 B.&S.		
Net weight .....	200 lbs.	245 lbs.	350 lbs.
Shipping weight .....	225 lbs.	300 lbs.	415 lbs.
Code Word .....	Abba	Abbot	Acorn



GENERAL VIEW OF DRILL.

### BLACK & DECKER ELECTRIC DRILL

The Black and Decker Manufacturing Company, 105-115 South Calvert St., Baltimore, Md., has recently added a new size to its line of portable electric drills. The new machine is shown in the

and will run continuously without overheating. The Morse taper socket is in the form of a separable sleeve secured in the drill spindle by means of a large knurled nut. By unscrewing this nut the entire taper socket is easily removed

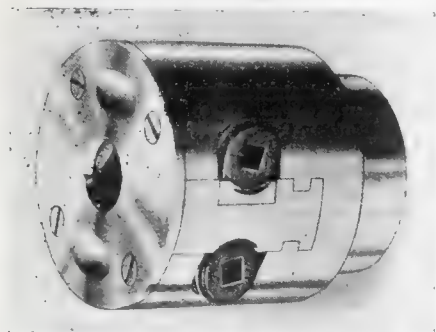
the bearing. The machine has the customary pistol grip and trigger switch, which characterize Black & Decker drills. The machine weighs 21 lb., has a no-load



speed of 600 r.p.m. and is supplied with interchangeable spade handle and breastplate, as well as electric connecting cable.

### MARVIN & CASLER DRILL CHUCK

In the accompanying illustrations is shown the Casler twin screw drill chuck, which is a recent product of the Marvin & Casler Co., Canastota, N.Y.



GENERAL VIEW OF THE CHUCK.

The body of this chuck is made of close-grained cast iron, and jaws and screws are of tempered high-carbon steel. The

### NEWTON CENTERING MACHINE

The newly designed centering machine, illustrated and described herewith, is a recent development of the Newton Machine Tool Works, Philadelphia, U.S.A., for centering rough and irregular forgings.

Two universal centering vises of the interlocking type are supplied with the machine. The jaws are adjustable by means of a screw giving a capacity for rounds from 2 in. to 12 in. in diameter and of any desired length.

Vices are adjustable on the bed by means of rack and pinion.

The spindle is of forged steel, 3 in. in diameter, running in bronze bushed bearings, has 4 in. cross and 4 in. of vertical adjustment, with 8 in. of hand feed.

The cross and vertical adjustments are equally divided from centre line of work.

The drive is by direct connected motor through a bronze driving gear.

Alignment of all adjustable parts is maintained by adjustable taper shoes.

Table of dimensions: diameter of spindle, 3 in.; in-and-out adjustment of spindle, 8 in.; vertical adjustment to spindle, 4 in.; cross adjustment to spindle, 1 in.; length of base, 16 ft.; width of

base, 22 in.; distance centre of vise to top of base, 15½ in.; maximum distance centre of spindle to top of base, 17½ in.; minimum distance centre to spindle to top of base, 13½ in.

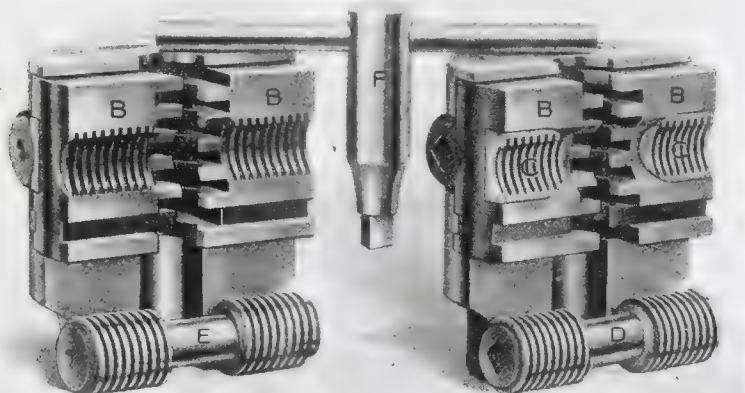
The All-Way Oiler Manufacturing Co., of Toronto, have placed on the market various oiler devices well worthy of investigation. The All-Way oiler is applicable to oil guns, combination filler and funnel, and the All-Way oil can.

Briefly, the oiler is the regular type of can fitted with flexible steel spout, made to bend in any desired angle or position without breaking or interfering with the flowing of the oil. There is no waste of oil when using this type of oiler, as the spout always reaches the desired spot.

At the end of spout a cleaning device is installed, which merely takes a second to operate. This same device also prevents oil from flowing too freely, thereby wasting.

The complete oiler is strongly made of copper-plated steel in different sizes.

Mr. H. Obee is manager of this concern handling these very useful lines.

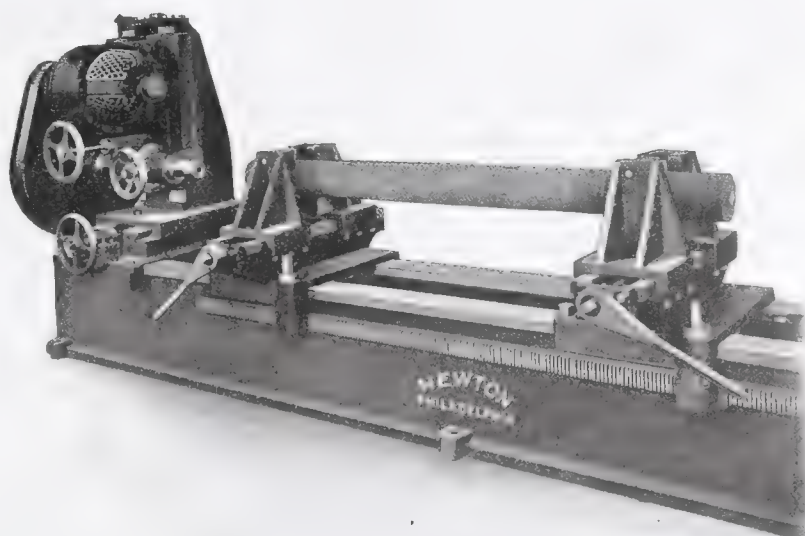


SECTION THROUGH THE CHUCK.

claim is made that the combination of cast iron and steel gives long life to the wearing surfaces between the body, jaws, and screws. It will be seen that the body is reinforced by a steel cap plate, which prevents it from spreading when under strain; and a secondary screw doubles the grip of the drill chuck jaws and allows the drill to be driven to the limit of its strength. When using the chuck, the primary screw E, Fig. 2, is first operated to grip the drill shank between the jaws, and after this primary screw has been set up, the secondary screw D is operated to bring the floating nuts C against the ends of the pockets in the jaws B. The tightening of this secondary screw D results in producing a grip on the drill shank that is claimed to be twice as great as that obtained from a single screw. All parts of the chuck are made interchangeable to facilitate replacement, and there are no projections likely to catch the work or injure the operator.

Returns prepared at Washington indicate that stocks of food in storage in the United States on June 1 last were 20 per cent. greater than a year before, and the prices, where not higher than in 1918, were quite as high. There may be a suggestion of relief in such a situation, even if the profiteer is doing his best to prevent it. It costs money to keep food-stuffs in store, and the holder, if he does not sell, has to provide it.

One way to save time and eye strain is to prepare a large chart in the form of a stenciled board. This is made large enough for figures to be easily read from any part of the stock-room.



GENERAL VIEW OF THE MACHINE.

## The MacLean Publishing Company

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PUBLISHERS OF

# CANADIAN MACHINERY

## AND MANUFACTURING NEWS

A weekly journal devoted to the machinery and manufacturing interests.

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## The Canadian National Exhibition

BEFORE the publication of next week's CANADIAN MACHINERY the Canadian National Exhibition will be in full swing. The last five occasions of this great fair have been held with the shadow of war hovering over, but they have achieved a great measure of success. This year, with the doubts and uncertainties of the war period put behind, it should surpass any previous attempt in both the number of its visitors and the excellence of the exhibits. Apart from the exhibits themselves, there will be much of a spectacular nature, to attract the seeker after fresh sensations. The presence of the popular son of our democratic King will also lend a fillip to the fair.

One of the finest features of this annual gathering is the opportunity it gives for Canadians to become acquainted with each other, and to learn the good points of parts of our broad country of which he has but the most vague ideas. There are many good people in Ontario who can expatiate largely on the wonderful mineral resources of their native province, who express extreme surprise when they are informed that Quebec produced the largest part of the world's asbestos supply. The man from the Western coast, who is apt to look on anything east of the Great Lakes as hopelessly slow and out-of-date, may feel like revising his opinion after a few days spent at the "Ex." Anything that can help to overcome the narrow sectionalism that is the bane of this country is doing a valuable work.

## Paying for the War

THE aftermath of Great Britain's long struggle is reflected in the speech of Mr. Lloyd George, warning his countrymen of the necessity of buckling down to earnest work to pay their debts. Great Britain poured out her blood and treasure with a lavish hand, and gave of what was her most vital asset unsparingly, that is her superb merchant fleet. Although the returns for the quarter ending June 30th show that she is beginning to pick up in this direction, she is still a long way behind, and the production of the coal mines has fallen off lamentably. With more men than ever before employed in the mines, the short hours and higher wages have increased the production cost enormously. The attitude of the labor unions under these circumstances is hard to understand. What benefit will accrue to them if they kick the country into bankruptcy is difficult to imagine, and we cannot think that the sound common-sense of the British people will allow the warning to go unheeded. There is a lesson to be gained from the British situation that should not be lost on some of the malcontents in Canada.

THE COUNTRY will sympathize with Sir Robert Borden in his unfortunate accident, which compels him to remain in bed while the festivities are in progress. However, it might be worse. In days gone by, a slip by a public man on the steps of a club when leaving would have given rise to many unkind conjectures.

DR. R. J. McFALL must be trying to get a position abroad. He has now got up and said right out that the price of beef has dropped. To call attention like that to a thing that nobody had even noticed, is sure to get him disliked. We expect to hear shortly that he has received an appointment to investigate the clothing situation in the Solomon Islands.

As a fundamental thing it might be well to say that labor should practise as well as preach. That is, take the same attitude towards capital that it asks capital to assume towards labor, live up to its agreements with capital, and be responsible for its acts.

"Scientific management" does not mean giving the smallest possible wage and selling the product in the dearest market—it means the greatest possible output with the least possible expenditure.

There is no doubt that there would be room for still further reductions in hours, and for considerable improvements in both time and piece rates, if we could as a nation accept the theory that when we are at work we should work with all our might.

The prospect for a broader development of the chrome iron deposits of the Eastern Townships is one of considerable interest to Canada as the deposits are quite extensive and have not been worked to advantage for many years.

Prior to the war these were worked by open cuts or quarries but the process became expensive and dangerous as operations descended to considerable depths and had to be abandoned owing to the low market price for the commodity. The big deposits which have served the big steel producing centres of the world are in Rhodesia and New South Wales, so that during the war the commodity advanced to a high price around \$32 per ton.

SOME critics in England consider the money grants to the successful military and naval leaders as rather niggardly, if anything. Well, what does a half million pounds or so amount to in these days, when wealth is computed in billions?



# Another Viewpoint on the Accident Question

By ALBERT HEPWORTH

In your August 7th issue of CANADIAN MACHINERY you print a short article by Master Mechanic on the needlessness of accidents.

Master Mechanic treats this as a matter that is up to the individual workman. So it is, BUT legislation for the protection of the employee is to-day making big strides, and while individual carelessness is responsible for most accidents the law seems to hold the employer responsible because, theoretically, he should see that there was no opportunity for carelessness.

This attitude is rather hard, but it has ended those little shops where five machines were crowded in where only two should have been, where a tall man had to be careful in straightening up for fear of hitting his head against the countershaft, or where one had to bend under the belting should one wish to leave his machine. The writer has worked in some of these machine shops.

Some accidents are no doubt hard to avoid. A man might suddenly be taken ill and so become caught in a machine despite guards, an emery wheel might burst when put in motion, and a piece escape from the guard with enough velocity to inflict serious injury, a shaft hanger may snap under some sudden tension and come crashing down, a punch press may repeat, etc. The first of these is so rare as to be nil; the second can be reduced to nil by careful instruction of the operator, so that he will handle the wheels as they should be handled and not thrown around every time they are changed; the third can best be eliminated by the use of a steel hanger, as this hanger will bend rather than break, and the fourth can be reduced to a minimum by careful and forceful instructions to both the die setter and operator, etc.

Accidents described under your sub-heading, "Don't Take the Short Cut," are simply up to the management, because the first rule of all safety-first campaigners in any shop is that safety first rules and regulations are to be enforced regardless of the prejudices or the position of the objectors.

The writer a few years back was employed in a press shop, where methods of production were rather loose. Of course, the rate of accidents was high. The introduction of state insurance quickly brought the state inspectors on the back of the officials, because of the high accident rate, and something had to be done.

It was pointed out that large concerns having special departments for employment adopted a physical examination, and it was decided to adopt this; and eventually discharge all those not up to standard. I, though in charge of a department, was automatically in line for discharge and it gagged.

Noting that the slackness over the shop was the same I had eliminated in my department, I took the bull by the horns and saw the manager, and in the end the promise was given me to have my views laid before the executive board. This led to the appointment of myself to the following new duties: (1) That all applicants for a job be subjected to a physical examination and the jobs graded, for it was felt that, whereas a physically perfect man ought to be less liable to cause an accident, this did not at all hold in practice, in fact, the reverse seemed to hold; (2) that a perpetual shop inventory be held and kept up; this eliminated a great waste, and in the case of piece-workers a great deal of intentional or unintentional over-counting; (3) that all safety guards be put up and kept up, I being responsible to see that they were; (4) that all employees were instructed in the methods of safety.

The plan of combining these duties was, of course, only feasible in a small shop, but it has been found not only there, but in larger shops that the making of one man responsible for the application of safety devices has tended to decrease accident.

In the above case we found that during six months this system was in operation (I left to take another position then) not an accident occurred, and as far as I know this still holds good, though I have been out of touch with this plant.

Accidents, like the poor, we have always with us, but they can be reduced to a disappearing point.

The State and Government Insurance Departments will hold the employer rather than the employee responsible; in fact, accusations of gross negligence or carelessness on the part of the workman, unless proven beyond dispute, will not exonerate. Elimination of accidents is up to the employer to a great extent. This does not mean increased cost, but will certainly mean higher production and more contented men. The employer who insists on safety first may in many cases be called a crank, but his shop will not be called a butcher shop.

The above, I hope, will give you some light on accident prevention, and I hope will answer in part the question contained in the last paragraph of the article by Master Mechanic.

---

Dissolve one part of pearl ash in about eight parts of water; add one part of shellac and heat the entire mixture up to the boiling point. When the shellac has completely dissolved, cool the solution, and saturate it with chlorine until the shellac precipitates out entirely. When it is redissolved in alcohol, it makes a varnish which is as transparent as any copal varnish, and more satisfactory for a large number of purposes. This is a trade secret worth knowing.

---

To conserve the fats contained in the table refuse and dishwater of the soldiers' mess, the British military authorities installed grease traps. The fat collected in these traps averages more than one ounce for each man daily. The trap consists of a tin-lined wooden box, divided into two compartments by a partition that does not reach the bottom by about four inches. The dishwater and the table refuse are poured through a strainer into the vat. As the water cools, the fat forms a crust on top and is skimmed off.

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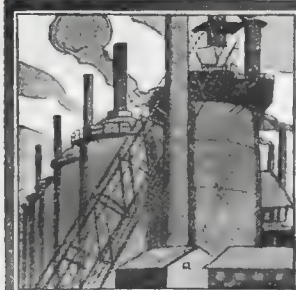
A friend of mine who does heavy work of various kinds which requires gloves, and heavy leather gloves at that, advises me that gloves can be made to wear almost like iron by applying axle grease sparingly and being very careful not to get it on the cloth stitching, as the axle grease may disintegrate it somewhat.

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Valuable china may be mended with the following mixture, and when dry it will resist hot water and ordinary usage. Mix a teaspoonful of alum and a tablespoonful of water. Place in a hot oven until it is quite transparent. Wash the broken pieces in hot water, dry and put them into the oven until they are warm; and while still warm coat the broken edges with the mixture thinly and quickly as it sticks instantly.

---

A handy paint mixer has recently been patented, consisting of a handle to which are secured two metal blades, intersecting each other at right angles. The lower portion of each is of dovetail shape, while above it is a pair of wings. This device is operated by immersing the blades in the paint, and then revolving them rapidly by placing the handle between the palms of the hands and moving them back and forth, as if rubbing them together.



## MARKET DEVELOPMENTS



### Dealers Report Continued Steady Buying

Machine Tool Dealers, Machine Shop Supply Men, and Steel Warehousemen All Report Steady Buying in Small Quantities—  
Automobile Trade Good Buyer

IN SPITE of embargoes, railway shopmen's strikes, and other strikes and threats of strikes, machine tool dealers, machine shop supply men and steel warehouse men profess themselves well satisfied with the situation. One machine shop supply man stated that the last two weeks were the best he had had this year, although all his business was made up of small orders. This shows that most of the small machine shops are keeping busy. An outstanding feature is the steady demand for material from the automobile trade, while railways are also buying freely, as reported last week.

\* \* \* \*

REPORTS from the United States show that there is a general stiffening of prices in the iron and steel markets. This is chiefly due to a better demand, but threats of further tie-ups due to various strikes make producers inclined to be conservative. There are so many factors to be taken

into account that it is hard to keep track of them. The strike of the ore dockers stopped the movement of ore from Lake Superior, and the railroad car shop workers' strike produced a shortage of cars. Increased wages to railroad workers will bring about higher freights, so it is only natural that producers want to see just where they are heading. Basic pig iron has been sold in England at 165 shillings, considerably lower than American iron could be delivered there. There is considerable enquiry for export iron and the lowering of freights to Great Britain has enabled some orders to be booked for there.

\* \* \* \*

STEEL scrap has weakened somewhat from last week's prices, but it is thought that this is but a temporary condition. The labor situation is again affecting buyers of this trade, and the conditions are generally unsettled.

### THE MARKET IS DULL AND UNSTEADY

Special to CANADIAN MACHINERY.

MONTREAL, Que., Aug. 18.—A combination of circumstances exist at present to make the current market of uncertain character. To the middle summer season, which is invariably associated with a decline in industrial activity and reduced demand, is added the disturbing element of labor unrest, a factor that is influencing the market conditions to no small degree. Conservative methods are the rule when sales are made, as the future is more or less obscured in the developments that are daily altering the outlook of business. Industry to-day is very much regulated by the attitude of labor and their demands, and while these, to some extent, are in keeping with the general conditions, the disorganization that is resultant of strikes and wage demands, is not conducive to normal industrial enterprise. The mills are not disposed to accept far future bookings, owing to the uncertainty of production costs, and consumers are only covering their immediate needs, the principal reason being the same as that of the producers. Many of the steel districts in the States are either affected by labor troubles or by the threatened demand for increased

wages, factors that may ultimately result in early shut-downs, or curtailment of output. The general effect of a strike of any magnitude is felt all along the line, and when production stops at one point, the falling off in demand is at once transmitted to all other branches. It is this unrest among employees that prevent a more liberal policy of reconstruction. Many manufacturers of steel supplies and products are disposed to operate on a low profit basis in an effort to curb the demands of the men, but if wage increases are granted it must mean a further advance in steel prices. Steel activity in this district is confined to current requirements of consumers and the demand is about normal. The curtailment of operations at the Sydney plant of the Dominion Iron and Steel Co. is affecting the other areas that supply the basic materials of the steel mill of the company. The production of ore at Wabana will gradually ease up as a result of the reduced requirements. The limestone quarries of the company in Newfoundland has also suspended operations, as about a year's supply is now on hand. With mill quo-

tations firm, dealers here have made no change in prices.

#### Single Machines Predominate

No new developments have taken place in machine tools of late and the general situation is virtually the same as it has been for the past couple of months. The volume of business passing is not great, but is of a character to encourage the dealer. The number of sales is the feature of interest, and while few of these run not more than one or two machines, the greater distribution compensates for the loss of larger orders. Like many other industries, the machine tool business is affected by the labor unrest, directly in some cases and indirectly in others. Uncertainty is the keynote and expansion or extension of manufacturing is difficult under such conditions. Supplies are moving with the usual freedom, but purchases are almost exclusively confined to current requirements.

#### Scrap Again Quiet

Market speculation is the chief factor affecting old materials at the present time, as the quiet demand does not tend to move the price of scrap one way or another. Some increased buying was felt a few weeks back, but this has been replaced by another dull period, in which the metal moves but slowly. The season



of the year may be partly accountable for this condition, as steel business is generally more or less affected about this time of the year. The apex of a few weeks ago has again been taken off and quotations show the market at a lower level, but the tone is one where anything may happen and it would not be surprising to see another reaction next week, with prices stronger. Cop-pers have declined about 2 cents per lb. in the past two weeks. Brass scrap is more firm, but has declined slightly in red brass turnings, also light and medium brass, which are one cent easier. Several steel lines show declines. Rails are down to \$14.50 per ton, a drop of \$5.50 in about three weeks. Wrought iron pipe has declined from \$11 to \$8 per ton.

#### STEADY VOLUME OF BUYING

TORONTO.—While there is no big buying being done, there is a steady volume of small orders which make business in most lines very satisfactory. As one dealer remarked: "We expected after the armistice to be able to take a six months' rest, but haven't seen the change yet." The unsettled conditions in the labor market are no doubt responsible for some holding back on the part of buyers, there is enough being done to make a very respectable turnover. This applies to machine tools and machine shop supplies generally. There are no price changes to record in the steel market, but they are in the air. Chain manufacturers held a meeting last week at which the price of chain was discussed, and, though nothing has been announced, it is expected prices will go up shortly on this

### POINTS IN WEEK'S MARKETING NOTES

The continued unrest in the labor market is discouraging buyers of steel. Building construction falling off.

\* \* \*

Machine tool and machine shop supply dealers are doing good business, though there is no large single buying.

\* \* \*

There has been a dull week in the scrap metal market, with a drop of prices in steel making grades.

\* \* \*

The automobile trade is buying considerable quantities of sheets, and automobile and railway buying is keeping steel warehousemen busy.

\* \* \*

Basic pig iron from the Lorraine district of France has been sold in England at a much lower price than the American iron.

material. There is a good buying of warehouse stocks, the railways being responsible for some of it, but the automobile trade for the larger part. Mills making automobile sheets are far behind on orders, and will not promise delivery in less than four to six months. This turns the attention of the makers to other sources of supply, that is the warehouses. There is not much demand for structural steel.

mally good times the railroads take, in one form or another, from 15 to 25 per cent. of the steel industry's output, and after a period of several years of particularly stringent economy they might be expected to take more, but now they are taking practically no steel and they will take no tonnage of consequence until their position is assured. The attitude of labor disclosed in the past fortnight defers the time when the steel industry can expect the railroads to be large customers.

As to ordinary manufacturing consumers, there are some strikes, and possibilities of others, and each strike temporarily deprives the steel industry of a customer.

It has become a generally accepted view that when there is a full normal demand for steel at least half the tonnage passes into works of permanent construction, classifiable as investments. Such construction requires favorable prospects for its inception. The investor must be assured that he would not save much money, in first cost, by waiting a year or two, and he certainly must be assured that if the job were undertaken, labor and materials would be continuously available until completion, for until completion the money spent is earning nothing. The increased labor unrest now manifest is observed to be having a discouraging influence upon investors. An evidence of this is the rate at which contracts for fabricated steel work are being placed. This business was growing very nicely in the second quarter of the year, promising eventual establishment of a rate of buying equal to the capacity of the fabricating shops, but in the past week or two the contracting has been distinctly lighter than formerly.

Presumably, as a result of these developments there is now a much more conservative spirit throughout the iron and steel trade. Producers are less willing to enter into contracts, fearing they may have trouble in making deliveries, while buyers are still less willing to make contracts. The volume of strictly new buying is much lighter than a month ago, but the volume of shipping orders, made up chiefly of specifications on old contracts, is heavy and is easily in excess of the rate at which material is being shipped.

Merely from the viewpoint of the business that the steel industry does not get the situation and prospects appear far from favorable, but from another angle this makes the situation all the more favorable, because with all these defects in the market situation there is a large demand for steel. The mills are operating at about 80 per cent. of capacity and no one seems to doubt but that the material made and shipped is going directly into consumption. With many buyers, particularly the railroads and investors, not represented, or, but poorly represented in the market, the volume of tonnage taken by others is large, much larger than anyone would

## CONCERN IS FELT FOR FUTURE OF STEEL BUSINESS

Special to CANADIAN MACHINERY.

PITTSBURGH, Pa., Aug. 21.—A much more conservative spirit is shown by both buyers and sellers, owing to recent unsettling developments, chiefly in connection with labor. The increased labor unrest makes it questionable whether manufacturing operations can be maintained at all points. The steel producers are less concerned over their own labor outlook than over the outlook of their customers. There is a possibility of a strike in the steel industry, but the prospect is very far from a probability. At the Detroit convention, over a year ago, the American Federation of Labor decided upon an aggressive policy of attempting to unionize the steel industry. At the Atlantic City convention last June the reports admitted that little success had attended the efforts, but since then the federation has been striving more earnestly. The information gathered by steel producers indicates that up to date nothing by way of organization has been accomplished that would make it feasible to attempt a

strike. While the steel makers are very painstaking in gathering information, they admit that the possibilities of there being a strike may be greater than their information indicates.

Much more concern, however, is felt regarding the future operations of the steel industry's customers. There are involved three general classes of steel consumers, the railroads, the ordinary manufacturing consumers and those who might engage in large construction jobs of an investment character, such as factories, hotel and office buildings, power plants, bridges and the like.

As to the railroads, the demands of the brotherhoods for the Plumb plan of tripartite control obviously serve to make the future of the railroads still more uncertain, that such a radical and unpopular plan would really be adopted is improbable, but the time when the railroads will be placed in a settled position and thereby be able to engage in work of rehabilitation and expansion is placed farther in the future. In nor-



have expected. With only a moderate volume of additional business the steel industry would be operating at capacity.

It is now fairly well established that there will be no advances in the important finished steel products this year, unless there should be a wage advance, which at the present time seems improbable. The only reason it seems worth while to mention the fact that price advances are altogether unlikely is that a few weeks ago many steel producers, for reasons that were not entirely obvious, were talking about the probability of there being price advances.

The local pig iron market is strong, at least on the surface, the furnaces that are in operation being well sold up, while there is a fair running demand. Occasional lots of surplus iron, however, are sold with such difficulty that it is evident there are no large unsatisfied requirements. There are many idle furnaces and it is only occasionally that a furnace blows in. A demand for pig iron that would give the furnaces even moderately full employment can hardly occur without the large steel works buying pig iron. This they do when they are pressed for tonnage and have to supplement their own pig iron make by outside purchases.

The scrap market became weak and inactive a fortnight or so ago and has not since improved. The mills are all out of the market as to heavy melting steel, though some of them intimate they may make some purchases in a few weeks. Heavy melting steel is off about \$2 from its high point of three weeks ago.

## SENTIMENT AGAINST PRICE ADVANCES

Special to CANADIAN MACHINERY.

NEW YORK.—Though on a supply and demand basis, prices are due for a revision upwards, the sentiment is against any advance at the present time. This is on account both of the attitude of labor and the general result on the high cost of living. Makers are not taking orders far ahead, except where the purchaser is an old customer. There is no demand as yet for heavy shapes, the general investment demand not yet having come out. The Railroad Administration has an enquiry out for 100,000 tons of rails, but this is evoking but little interest. At the time of the last enquiry \$55 was quoted.

Warehouse business is quiet, except in sheets, for which some sizable orders have been placed. In view of the probable car shortage mills are requesting that they be allowed to ship sheets in any cars available, protecting the stock as well as they can, but forwarding at buyer's risk. This impending shortage of cars and the probable advance of mill prices is expected to stiffen prices shortly.

There has been good business in cast

iron pipe lately, but an enquiry for about 900 tons of six-inch and larger brought out some low prices. Prices last week quoted for 6-inch and heavier were \$51 to \$52.30.

## HIGHER PRICES ALL ROUND

Special to CANADIAN MACHINERY.

From every point comes news of stiffening prices for pig iron. Probably the only point where this is not true is in the southern areas. Following are reports from the principal United States points:

**New York.**—There is considerable strength to the market here, and a brisk business, both domestic and foreign, is being done. Several thousand tons have been sold for United Kingdom, and enquiries amounting to nearly 200,000 tons for export are out. Central Foundry Co. purchased 10,000 tons foundry for delivery in last half and first half of 1920.

**Boston.**—Prices have made a general advance above the \$28 Buffalo basis for No. 2X eastern iron. The advance is from \$1 to \$1.50 per ton. There has been some buying for first half delivery, and enquiry for last quarter and first half is good. New England sales during the week are around 7,500 tons.

**Pittsburgh.**—With makers of foundry iron well booked up for the remainder of the year, there is a tendency to look askance at 1920 business. This is due to the uncertainty of the labor market. The foundry men are feeling uneasy over the prospect of very much higher prices, \$35 per ton having been mentioned as a possibility. Sales of foundry iron are around 20,000 tons.

**Chicago.**—There is not much enquiry, but a fair amount of selling is being done. Enquiries are being followed by sales with little delay. The strike of railroad shopmen has interfered with shipments, but not sufficiently to reduce the melt. The American Radiator Co. has purchased 4,000 tons for its Birmingham plant.

**Buffalo.**—There is a large volume of buying being done in spite of increase in prices. The aggregate sales amount to between 40,000 and 50,000 tons. Quotations are as follows: Basic, \$26.75; No. 2 plain, \$26.75 to \$28; No. 2 X, \$28 to \$29; malleable, \$27.25 to \$29. Nearly all sales were for last half, a small proportion being for first half of 1920.

**Cincinnati.**—The situation here may be classified as a waiting one. There is not much prompt iron to be had, except in the case of furnaces which have off iron they are anxious to be rid of. The Jackson County district is tied up with labor troubles. While prices have been advanced no business is being done at the new rates.

**St. Louis.**—There has been a little buying for last quarter and first quarter of next year. 1.25 to 2.25 silicon is quoted at \$26.75, with differentials on higher grades. Some foundries which had bought enough iron for their estimated consumption have had to purchase small additional tonnage.

**Birmingham.**—Selling is good, and it is expected that three more furnaces will be put in blast this month. There is no tendency to look for 1920 business on the part of furnaces, who are not even making any efforts for fourth quarter selling. No. 2 foundry is on a basis of \$27.75.

**Philadelphia.**—While business has reached a fair aggregate total, it is much less than previous weeks. Furnaces are mostly asking higher prices. Copper free low phosphorus iron is quoted \$36 to \$38 furnace according to analysis.

## LABOR UNREST UNSETTLES MARKET

Special to CANADIAN MACHINERY.

The market through various causes is unsettled. The labor situation is affecting the market in some cases, and prices have weakened. Following are quotations from various United States centres:

**Boston.**—Brisk business and tightening prices are in evidence here. There has been some buying of heavy melting steel for Pittsburgh delivery and prices ranged from \$21 to \$22.50. No. 1 machinery has been active and has sold at \$28 for future delivery.

**Philadelphia.**—Steel scrap has weakened in some cases as much as \$1 per ton from last week's prices. Cupola scrap on the other hand has shown greater strength, now being quoted at \$25 to \$26. The labor situation has been the cause of weakening in steel.

**New York.**—There is a good demand for steel making grades, although the Pittsburgh buyers are not in evidence. Pennsylvania buying is good for the eastern part of the state, and the quotations on heavy melting are from \$15.35 to \$16.50 f.o.b. New York. The labor situation is making buyers more cautious.

**Pittsburgh.**—With buyers inclined to stay out of the market till the labor situation is clearer, and other buyers being about stocked up, scrap has weakened in all grades. The drop is about \$1 per ton all round.

**Buffalo.**—The scrap market is dull here, though it is probably but a temporary condition. Prices are being maintained, and it is thought that there will be renewed buying of heavy melting in the near future.

**Cleveland.**—Notwithstanding a weakened market, dealers are very hopeful for the future. They point out that the demand for the finished product is heavy, and this is bound to be reflected in the scrap market. A sale of heavy melting involving 50,000 tons is reported, the price ranging from \$19 to \$23.

**Chicago.**—Although prices have halted after the long-continued advance from the spring, it would only take a small resumption of buying to bring them back again. Here, as elsewhere, the uncertain state of the industrial world is affecting the scrap market, which is always susceptible to these influences. Quotations for spot business are some-



what lower than the lately prevailing rates.

**Cincinnati.**—A dull market with prices unchanged is the condition here. Dealers are slow in buying outside iron that may be held up in delivery, cars being scarce and the labor situation unsettled. Railroads are not offering anything.

**Birmingham.**—Buying is light, but prices remain firm. Heavy melting is quoted much higher than buyers are willing to consider. All grades show strength.

### READERS—ATTENTION!

**A**S no doubt readers of CANADIAN MACHINERY are well aware, Toronto Exhibition opens on August 23rd. Mechanics as a rule make their headquarters the Machinery Hall while at this fair, so a word to the wise is sufficient.

At the east end of this Machinery Hall, the **Garlock & Walker Machinery Co.** are going to have a display of more than ordinary interest. They have taken over a very large space, in fact 1,400 square feet of floor area, in order to show to best advantage the various machine tools they intend exhibiting.

Many of these machines will be in actual operation, with experts from the various factories operating them at full capacity. These gentlemen have been brought for a two-fold purpose, first to demonstrate the field and scope of their machines, and second to answer any questions relative to these machines. They invite close inspection, and will be only too pleased to give those interested all possible information. They particularly desire that questions be asked.

Included in this exhibit will be:

A "**Gooley-Edlund Inc. Co. Briggs Miller.**" Of course, the Briggs Miller is well known as a manufacturing miller with wonderful capacity, so that this feature will be of keen interest to those wishing greater production where a miller can be used to advantage.

Then there will be a **Stephoe 24 in. single pulley drive shaper**, also a **Bath No. 2 Universal Grinder**, adaptable to practically any grinding operation.

There will also be a **Fitchburg 8x36 Cylindrical Grinder**, whose qualifications are already well known to the machine trade.

A heavy duty **Ryerson-Conradson single pulley drive plain milling machine** will also be shown.

Another feature worth while will be a complete line of **Thor Pneumatic and Electric tools**. This alone is worthy of attention.

Some other interesting features will be a **Lodge & Shipley three step cone 24 in. engine lathe**, a **Sibley sliding head drill press**, a **Rockwood back geared drill**, and an **Edlund sensitive drill press**. All these will be of the latest design.

A **Kelley Routing Machine** will also be shown, with samples of work turned out by this interesting type of machine tool.

Perhaps two of the biggest features of this exhibit are the remaining ones to follow:

The first of these is the **Adams Short**

**Cut Lathe.** This lathe has never been exhibited here before and will prove an eye-opener to the progressive manufacturer, foreman or mechanic. Compact, accurate and built for manufacturing duplicate parts, this machine is indeed a study in good design. Six changes of speed are provided in an all geared head, and automatic stops, etc., etc., form a part of its equipment.

Automobile manufacturers, or, in fact, anyone desirous of making duplicate parts, would do well to look into this new machine tool.

Last but not least comes a varied line of **Cataract Machinery.**

A **Cataract sensitive drill**, with countershaft and back drill chuck will be shown. A **No. 3 Cataract Lathe**, with automatic chuck closer, together with screw slotting device, and medium weight turret, will be exhibited. This machine will also have a double cross slide.

Then there will be a **No. 4 Cataract Lathe** with thread chasing attachment. There will also be a **No. 3 lathe** with screw cutting, grinding, face and angle plate attachments, fully equipped with drill chuck and scroll and independent chucks.

A **No. 4 Cataract Bench Miller** will also be shown.

A **No. 7 Cataract Turret Tool Post lathe** will also form a part of this exhibit.

To show that a series of machines may be self-contained, the **Cataract** exhibit will also include an **R4 underdrive bench outfit**.

This arrangement will show four lathes, all self-contained and mounted on a special stand, together with a special underdrive.

A motor in convenient position on framework will drive the complete outfit.

Other interesting machines will also be shown, but space does not permit of further detail.

Enough to say to our readers in general that a visit to this exhibit will more than repay them for time spent in looking over this up-to-the-minute company's effort to place before those interested, a complete and varied line of machine tool equipment.

The **McAlear Manufacturing Co.** has recently moved into a new factory at Southwestern Avenue, Chicago, where they will manufacture their complete line of power plant and heating specialties, including packless radiator valves. They are issuing a new catalogue, dealing with these lines, which will be forwarded on request to any interested party.

The **Algoma Steel Co.** will have completed by November 1st their new rolling mills, wherein they will be able to manufacture beams and channels up to and including 15 in.; Z bars, rounds and squares, up to 14 in., and angles from 6 by 6 in. to 1 1/4 by 1 1/4 in.

Diamonds to the value of \$856,000,000 have been mined in South Africa.

### RECEIVE IMPERIAL SERVICE MEDAL

The following servants of the Canadian Department of Railways and Canals have been awarded the Imperial Service Medal:

Albert J. Atkinson, time-keeper, Moncton; Placide Babineau, carpenter, Moncton; Alexander Bain, station agent, Riverdale; Geo. T. Biddington, locomotive fireman, Moncton; John S. Cameron, section foreman, Penniac; W. D. Cantwell, toolroom keeper, Charlottetown; John Corbett, section foreman, Moncton; Harry Cummings, hostler, Stellarton; Aime Dumas, conductor, Riviere du Loup; John A. Fraser, machinist, Moncton; J. M. Grant, section foreman, Riviere du Loup; Jos. Guay, brakeman, Levis; Alfred Lebel, conductor, Riviere du Loup; Charles Mercier, engineman, Riviere du Loup; R. W. Orchard, conductor, Mont Joli; Jules P. Parent, engineman, Riviere du Loup; A. C. Reid, carpenter, Moncton; Francis W. Rioux, engineman, Riviere du Loup; Jos. Scott, engineman, Riviere du Loup; Benjamin Steeves, section foreman, Campbellton; Matthew C. Webster, station agent, Pictou; Job Yeo, engineman, Charlottetown.

"What a different world this would be if we used our eyes to see the best in others and encouraged each other by speaking of it."—The Three Partners.

Don't let your competitors fix the price of your product—fix it yourself to cover your costs and a reasonable profit.

Apply common-sense with your cost system. The easiest way sometimes is the best way. Keep everything simple. Don't make anything harder than it ought to be. But remember to keep the main idea constantly in view—"I want to know my costs!"

Ho! ye who in the workshop toil and sweat the long day through, remember that it's harder still to have no work to do. Ho! all who labor, all who strive, ye wield a mighty power. Do with your will, do with your might, fill every golden hour. The glorious privilege to DO is man's most noble dower.

A concern has been formed in Denmark to begin the manufacture of typewriters.

It is said that the waste of timber in the yellow pine industry alone is sufficient to furnish raw material for the daily production of 40,000 tons of paper, 3,000 tons of rosin, 300,000 gallons of turpentine and 600,000 gallons of grain alcohol.

An American contemporary prefers the old name of "hobo" because it is easier to pronounce than the modern name of "Bolshevik."



# SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

## PIG IRON

Grey forge, Pittsburgh .....	\$27 15
Lake Superior, charcoal, Chicago .....	34 60
Standard low phos., Philadelphia .....	29 35
Bessemer, Pittsburgh .....	25 75
Basic, Valley furnace .....	25 75
Toronto price:—	
Silicon. 2.25% to 2.75% .....	\$32.75 to \$35.75

## IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto .....	\$ 4 25
Steel bars, base, Toronto .....	4 25
Steel bars, 2 in. to 4 in. base .....	5 50
Steel bars, 4 in. and larger base .....	6 00
Iron bar, base, Montreal .....	3 75
Steel bars, base, Montreal .....	3 75
Reinforcing bars, base .....	4 50
Steel hoops .....	5 50
Norway iron .....	11 00
Tire steel .....	5 50
Spring steel .....	8 00
Brand steel, No. 10 gauge, base .....	4 40
Chequered floor plate, 3-16 in. ....	6 50
Chequered floor plate, ¼ in. ....	6 25
Staybolt iron .....	8 00
Bessemer rails, heavy, at mill. ....	2 35
Steel bars, Pittsburgh .....	2 65
Tank plates, Pittsburgh .....	2 45
Structural shapes, Pittsburgh .....	3 05
Steel hoops, Pittsburgh .....	4 50
F.O.B., Toronto Warehouse	
Small shapes .....	3 62
F.O.B. Chicago Warehouse	
Steel bars .....	3 72
Structural shapes .....	3 90
Plates .....	3 62
Small shapes under 3" .....	

## FREIGHT RATES

	Per 100 lbs.	C.L.	L.C.L.
Pittsburgh to Following Points			
Montreal .....	33	45	
St. John, N.B. ....	41½	55	
Halifax .....	49	64½	
Toronto .....	27	39	
Guelph .....	27	39	
London .....	27	39	
Windsor .....	27	39	
Winnipeg .....	89½	135	

## METALS

	Gross.	Net.
Lake copper .....	\$27 00	\$27 00
Electro copper .....	26 00	27 00
Castings, copper .....	26 00	25 00
Tin .....	60 00	58 00
Spelter .....	10 00	10 00
Lead .....	7 25	7 00
Antimony .....	10 25	10 50
Aluminum .....	36 00	35 00

Prices per 100 lbs.

## PLATES

	Montreal	Toronto
Plates, ½ up .....	\$ 4 50	\$ 4 50
Plates, 3-16 in. ....	4 90	4 90

Price List No. 38

## WROUGHT PIPES

	Standard Butt weld	
¼ in. ....	\$ 6 00	\$ 8 00
¾ in. ....	4 68	6 81
¾ in. ....	4 68	6 81
1½ in. ....	6 21	7 78
¾ in. ....	7 82	9 95
1 in. ....	11 56	14 71
1¼ in. ....	15 64	19 90
1½ in. ....	18 70	23 76
2 in. ....	25 16	32 01
2½ in. ....	40 37	51 19
3 in. ....	52 79	66 94
3½ in. ....	67 16	84 18

4 in. ....	79 57	99 74
Standard Lap weld		
2 in. ....	38 81	35 34
2½ in. ....	42 12	52 36
3 in. ....	55 08	68 47
3½ in. ....	69 00	86 94
4 in. ....	81 75	103 00
4½ in. ....	93	1 18
5 in. ....	1 08	1 37
6 in. ....	1 40	1 78
7 in. ....	1 83	2 32
8L in. ....	1 93	2 44
8 in. ....	2 22	2 81
9 in. ....	2 66	3 36
10L in. ....	2 46	3 12
10 in. ....	3 17	4 02

Terms 2% 30 days, approved credit.  
Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

## WROUGHT NIPPLES

4" and under, 60%.  
4½" and larger 50%.  
4" and under, running thread, 30%.  
Standard couplings, 4" and under, 40%,  
4½" and larger, 20%.

## OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds	Montreal	Toronto
Copper, light .....	\$15 00	\$13 75	
Copper, crucible .....	18 50	18 00	
Copper, heavy .....	18 00	18 00	
Copper wire .....	18 00	18 00	
No. 1 machine composition .....	17 00	16 75	
New brass cuttings .....	13 00	10 75	
Red brass cuttings .....	15 00	14 75	
Yellow brass turnings .....	10 00	9 00	
Light brass .....	8 00	7 00	
Medium brass .....	9 00	7 75	
Scrap zinc .....	6 00	6 00	
Heavy lead .....	5 00	5 25	
Tea lead .....	3 75	3 50	
Aluminum .....	18 00	18 00	
Heavy melting steel .....	13 50	13 50	
Shell turnings .....	7 00	6 00	
Boiler plate .....	13 50	11 00	
Axles (wrought iron) .....	20 00	20 00	
Rails .....	14 50	13 50	
Malleable scrap .....	15 00	17 00	
No. 1 machine cast iron .....	20 00	18 00	
Pipe, wrought .....	8 00	5 00	
Car wheels .....	20 00	20 00	
Steel axles .....	20 00	20 00	
Mach. shop turnings .....	6 00	6 00	
Stove plate .....	14 00	13 00	
Cast boring .....	7 00	8 00	

## BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ¾" and less .....	35
Carriage bolts, 7-16 and up .....	15
Coach and lag screws .....	50
Stove bolts .....	65
Wrought washers .....	50
Elevator bolts .....	25
Machine bolts, 7-16 and over .....	40
Machine bolts, ¾" and less .....	40
Blank bolts .....	25
Bolt ends .....	25
Machine screws, fl. and rd. hd., steel .....	27½
Machine screws, o. and fl. hd., steel .....	10

Machine screws, fl. and rd. hd., brass .....	net
Machine screws, o. and fl. hd., brass .....	net
Nuts, square blank .....	add \$0 75
Nuts, square, tapped .....	add 1 00
Nuts, hex., blank .....	add 1 00
Nuts, hex., tapped .....	add 1 25
Copper rivets and burrs, list less .....	15
Burrs only, list plus .....	25
Iron rivets and burrs .....	40 and 5
Boiler rivets, base ¾" and larger .....	\$8 50
Structural rivets, as above .....	8 40
Wood screws, O. & R., bright .....	75
Wood screws, flat, bright .....	77½
Wood screws, flat, brass .....	55
Wood screws, O. & R., brass .....	55½
Wood screws, flat, bronze .....	50
Wood screws, O. & R., bronze .....	47½

## MILLED PRODUCTS

(Prices on unbroken packages)

Set screws .....	50
Sq. and Hex. Head Cap Screws ..	45
Rd. and Fil. Head Cap Screws ..	20
Flat But. Hd. Cap Screws .....	10
Fin. and emi-fin. nuts up to 1 in. ....	45
Fin. and Semi-fin. nuts, over 1 in., up to 1½ in. ....	40
Fin. and Semi-fin. nuts over 1½ in., up to 2 in. ....	25
Studs .....	30
Taper pins .....	50
Coupling bolts, .....	10
Planer head bolts, without fillet, list .....	10
Planer head bolts, with fillet, list plus 10 and .....	net
Planer head bolt nuts, same as finished nuts. ....	net
Planer bolt washers .....	net
Hollow set screws .....	net
Collar screws .....	list plus 20, 30
Thumb screws .....	40
Thumb nuts .....	75
Patch bolts .....	add 20
Cold pressed nuts to 1½ in. ....	add \$1 00
Cold pressed nuts over 1½ in. ....	add 2 00

## BILLETS

	Per gross to
Bessemer billets .....	\$38 50
Open-hearth billets .....	38 50
O.H. sheet bars .....	42 00
Forging billets .....	51 00
Wire rods .....	52 00

Government prices.  
F.O.B. Pittsburgh.

## NAILS AND SPIKES

Wire nails .....	\$4 70
Cut nails .....	4 75
Miscellaneous wire nails .....	60%
Spikes, ¾ in. and larger .....	\$7 50
Spikes, ¼ and 5-16 in. ....	8 00

## ROPE AND PACKINGS

Drilling cables, Manila .....	0 39
Plumbers' oakum, per lb. ....	0 10
Packing, square braided .....	0 38
Packing, No. 1 Italian .....	0 44
Packing, No. 2 Italian .....	0 36
Pure Manila rope .....	0 37
British Manila rope .....	0 31
New Zealand hemp .....	0 31
Transmission rope, Manila ....	0 43
Cotton rope, ¼-lb. and up .....	0 74

## POLISHED DRILL ROD

Discount off list, Montreal and Toronto .....	net
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# LeBLOND

## HEAVY DUTY Universal Millers

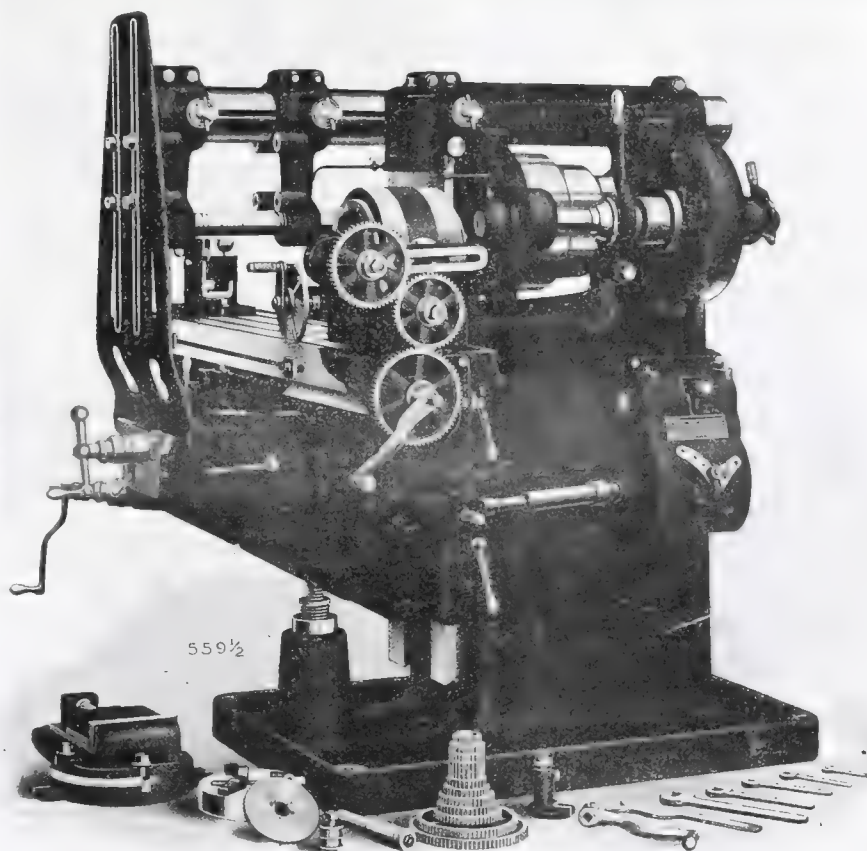
Are not only Tool Room Machines, but as a manufacturing proposition appeal to the careful buyer.

Their long life insures ample returns for the investment made.

May we explain to you their many advantages and the convenience of their control.

Carried in stock by

**The A. R. Williams  
Machinery Co.  
LIMITED  
TORONTO**



559½

## Acid Electric STEEL CASTINGS

Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

### Railroad and Other High Grade Castings

up to 15 tons, any specification. Electric Steel Castings COST NO MORE than ordinary Steel Castings.

*Prices on Application—Prompt Deliveries*

**The Thos. Davidson Mfg.  
Co., Limited**

Steel Foundry Division, Lachine Canal

Head Office: 187 Delisle St. MONTREAL  
Phone Victoria 1492

**MORROW**

**SCREWS**

**MORROW**

**THE MORROW  
PLANTS AT  
INGERSOLL**

are an example of what can be attained by years upon years of skill, and honesty of purpose and liberal treatment of customers.

The company and the men are in perfect harmony—some of the men have worked continuously here for over 30 years—like one big family—from 300 to 700 people, all proud of their product and all striving with one object to give you the very best, *Twist Drills, Set and Cap Screws, Nuts, etc.*, that are produced anywhere.

Every article, whether screws, nuts or drills, is guaranteed fully—you must be satisfied or your money will be refunded.

*Ask Your Jobber*

**John Morrow Screw & Nut Co., Ltd.**

*Ingersoll Files Are Good Files*

**MORROW**

**NUTS**

**MORROW**



## MISCELLANEOUS

Solder, strictly .....	\$ 0 34
Solder, guaranteed .....	0 39
Babbitt metals .....	18 to 70
Soldering coppers, lb. ....	0 58
Lead wool, per lb. ....	0 14
Putty, 100-lb. drums .....	6 75
White lead, pure, cwt. ....	17 80
Red dry lead, 100-lb. kegs, per cwt. ....	15 50

Glue, English .....	0 35
Tarred slater's paper, roll ...	1 30
Gasoline, per gal., bulk .....	0 33
Benzine, per gal., bulk .....	0 32
Pure turpentine, single bbls., gal. ....	1 50
Linseed oil, raw, single bbls. ....	2 90
Linseed oil, boiled, single bbls. ....	2 92
Plaster Paris, per bbl. ....	4 50
Sandpaper, B. & A. ....	List plus 43
Emery cloth. ....	List plus 37½
Sal Soda .....	0 03½
Sulphur, rolls .....	0 05
Sulphur, commercial .....	0 04½
Rosin "D," per lb. ....	0 07
Rosin "G," per lb. ....	0 08
Borax crystal and granular. ....	0 14
Wood alcohol, per gallon ....	2 00
Whiting, plain, per 100 lbs. ....	2 50

## CARBON DRILLS AND REAMERS

S.S. drills, wire sizes up to 52. ....	40
S.S. drills, wire sizes, No. 53 to 80 .....	50
Standard drills, all sizes. ....	50
3-fluted drills, plus .....	10
Jobbers' and letter sizes. ....	50
Bit stock .....	40
Ratchet drills .....	15
S.S. drills for wood .....	40
Wood boring brace drills. ....	25
Electricians' bits .....	30
Sockets .....	50
Sleeves .....	50
Taper pin reamers .....	net
Drills and countersinks. ....	list plus 10
Bridge reamers .....	50
Centre reamers .....	10
Chucking reamers .....	net
Hand reamers .....	10
High speed drills, list plus 10 to 40 .....	net
Canadian high speed cutters .....	net
American .....	plus 40

## COLD ROLLED SHAFTING

At mill .....	list plus 5%
At warehouse .....	list plus 25%
Discounts off new list. Warehouse price at Montreal and Toronto	

## IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

## SHEETS

	Montreal	Toronto
Sheets, black, No. 28. ....	\$ 6 55	\$ 6 00
Sheets, black, No. 10. ....	5 15	5 45
Canada plates, dull, 52 sheets .....	8 50	7 10
Can. plates all bright. ....	8 50	8 00
Apollo brand, 10½ oz. galvanized .....		
Queen's Head. 28 B.W.G. ....		
Fleur-de-Lis. 28 B.W.G. ....		
Gorbals Best, No. 28. ....		
Colborne Crown, No. 28. ....		
Premier, No. 28 U.S. ....	7 50	
Premier, 10½ oz. ....	7 80	
Zinc sheets .....	20 00	20 00

## PROOF COIL CHAIN

(Warehouse Price)

## B

¼ in., \$13.50; 5-16, \$11.50; ¾ in.,

\$10.50; 7-16 in., \$9.30; ½ in., \$10.15; \$13.00; ¾ in., \$9.60; ¾ in., \$9.70; ¾ in., \$9.95; 1 in., \$9.50; Extra for B.B. Chain, \$1.20; Extra for B.B.B. Chain, \$1.80.

## ELECTRIC WELD COIL CHAIN B.B.

½ in., \$16.75; 3-16 in., \$15.40; ¼ in., \$14.20; 5-16 in., \$11.50; ¾ in., \$10.50; 7-16 in., \$9.30; ½ in., \$10.50; ¾ in., \$10.00; ¾ in., \$9.70.

Prices per 100 lbs.

## FILES AND RASPS

	Per Cent
Globe .....	50
Vulcan .....	50
P.H. and Imperial .....	50
Nicholson .....	32½
Black Diamond .....	27½
J. Barton Smith, Eagle .....	50
McClelland, Globe .....	50
Delta Files .....	20
Disston .....	40
Whitman & Barnes .....	50
Great Western-American .....	50
Kearney & Foot, Arcade .....	50

## BOILER TUBES.

Size.	Seamless	Lapwelded
1 in. ....	\$25 00	\$.....
1¼ in. ....	27 00	.....
1½ in. ....	28 00	26 00
1¾ in. ....	30 00	26 00
2 in. ....	30 00	26 00
2¼ in. ....	33 00	28 00
2½ in. ....	40 00	32 00
3 in. ....	46 00	38 00
3¼ in. ....	.....	45 00
3½ in. ....	56 00	42 00
4 in. ....	70 00	54 00

Prices per 100 ft., Montreal and Toronto

## OILS AND COMPOUNDS.

Castor oil, per lb. ....	.....
Royalite, per gal., bulk .....	19½
Palacine .....	22½
Machine oil, per gal. ....	27½
Black oil, per gal. ....	16
Cylinder oil, Capital .....	52
Cylinder oil, Acme .....	39½
Standard cutting compound, per lb. ....	06
Lard oil, per gal. ....	\$2 60
Union thread cutting oil, antiseptic .....	88
Acme cutting oil, antiseptic .....	37½
Imperial quenching oil .....	39½
Petroleum fuel oil, bbls. net .....	10¼

## BELTING—No 1 OAK TANNED

Extra heavy, single and double. ....	30%
Standard .....	30, 10%
Cut leather lacing, No. 1 .....	2 20
Leather in sides .....	1 75

## TAPES

Chesterman Metallic, 50 ft. ....	\$2 00
Lufkin Metallic, 603, 50 ft. ....	2 00
Admiral Steel Tape, 50 ft. ....	2 75
Admiral Steel Tape, 100 ft. ....	4 45
Major Jun. Steel Tape, 50 ft. ....	3 50
Rival Steel Tape, 50 ft. ....	2 75
Rival Steel Tape, 100 ft. ....	4 45
Reliable Jun. Steel Tape, 50 ft. ....	3 50

## PLATING SUPPLIES

Polishing wheels, felt .....	3 25
Polishing wheels, bull-neck. ....	2 00
Emery in kegs, American. ....	07
Pumice, ground .....	3½ to 05
Emery glue .....	28 to 30
Tripoli composition .....	06 to 09
Crocus composition .....	08 to 10
Emery composition .....	08 to 09
Rouge, silver .....	35 to 50
Rouge, powder .....	30 to 45

Prices per lb.

## ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive .....	.08½
Grits, 80 and finer .....	.05

## BRASS—Warehouse Price

Brass rods, base ½ in. to 1 in. rod 0 34

Brass sheets, 24 gauge and heavier, base ..... \$0 42 || Brass tubing, seamless ..... | 0 46 |
| Copper tubing, seamless ..... | 0 48 |

## WASTE

XXX Extra. ....	19½	Atlas .....	17
Peerless .....	19	X Empire .....	15½
Grand .....	18	Ideal .....	16
Superior .....	18	X Press .....	14
X L C R .....	17		

## Colored

Lion .....	15	Popular .....	12
Standard .....	13½	Keen .....	10½
No. 1 .....	13½		

## Wool Packing

Arrow .....	25	Anvil .....	15
Axle .....	20	Anchor .....	11

## Washed Wipers

Select White. ....	11	Dark colored. ....	09
Mixed colored. ....	10		

This list subject to trade discount for quantity.

## RUBBER BELTING

Standard ... 10% Best grades... 15%

## ANODES

Nickel .....	.58 to .65
Copper .....	.38 to .45
Tin .....	.70 to .70
Zinc .....	.18 to .18

Prices per lb.

## COPPER PRODUCTS

	Montreal	Toronto
Bars, ½ to 2 in. ....	\$42 50	\$43 00
Copper wire, list plus 10. ....		
Plain sheets, 14 oz., 14x60 in. ....	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz. ....	48 00	48 00
Copper sheet, planished, 16 oz. base .....	46 00	45 00
Braziers', in sheets, 6x4 base .....	45 00	44 00

## LEAD SHEETS

	Montreal	Toronto
Sheets, 3 lbs. sq. ft. ....	\$10 25	\$11 50
Sheets, 3½ lbs. sq. ft. ....	10 00	11 00
Sheets, 4 to 6 lbs. sq. ft. ....	9 75	10 50
Cut sheets, ½c per lb. extra. ....		
Cut sheets to size, 1c per lb. extra. ....		

## PLATING CHEMICALS

Acid, boracic .....	\$ .25
Acid, hydrochloric .....	.06
Acid, nitric .....	.14
Acid, sulphuric .....	.06
Ammonia, aqua .....	.15
Ammonium, carbonate .....	..
Ammonium, chloride .....	.55
Ammonium hydrosulphuret ..	.30
Ammonium sulphate .....	.15
Arsenic, white .....	.27
Copper, carbonate, annhy .....	.50
Copper, sulphate .....	.22
Cobalt, sulphate .....	.20
Iron perchloride .....	.40
Lead acetate .....	.25
Nickel ammonium sulphate ..	.25
Nickel carbonate .....	.32
Nickel sulphate .....	.35
Potassium carbonate .....	.75
Potassium sulphide (substitute) ..	2.25
Silver chloride (per oz.) .....	1.45
Silver nitrate (per oz.) .....	1.20
Sodium bisulphite .....	.15
Sodium carbonate crystals .....	.05
Sodium cyanide, 127-130% .....	.40
Sodium hydrate .....	.22
Sodium hyposulphite per 100 lbs. ....	6.00
Sodium phosphate .....	.18
Tin chloride .....	.80
Zinc chloride, C.P. ....	.80
Zinc sulphate .....	.15

Prices per lb. unless otherwise stated



# Use Wahlstrom Chucks

**POSITIVE DRIVE  
AUTOMATICALLY  
SELF-CENTERING  
NO SLIPPAGE**

# Aikenhead's Wahlstrom Attachment

**Speed Up Production  
in Your Machine Shop**

Consider the merits of an automatic chuck that keeps the spindle of every drill press running without a second's stop.

Calculate the money value of the minutes saved by the Wahlstrom chuck each time a tool is changed.

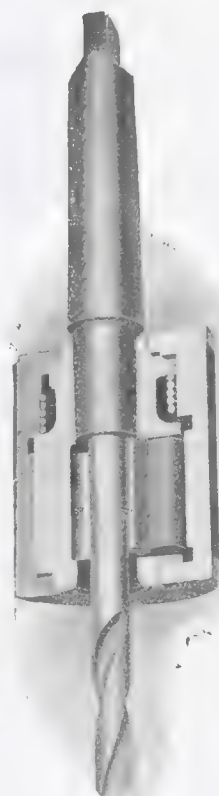
The Wahlstrom chuck—not the operator—centres the tool perfectly. It enables the operator to make tool changes in less than two seconds. Spindle of machine never stops. And there is absolutely no delay because of tool slippage. For no tool gripped by the jaws of a Wahlstrom chuck can slip. If the resistance on the tool is great, the holding power of the jaws increases.

*Send for Bulletin*

**Aikenhead Hardware Co., Limited**

17, 19, 21 TEMPERANCE STREET

TORONTO, CANADA



# Aikenhead's DUMORE ELECTRIC GRINDERS

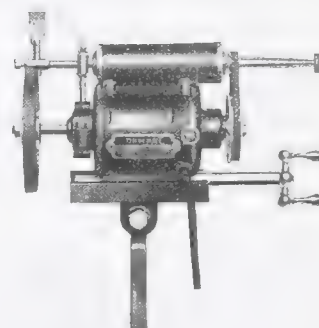
**Invaluable for Accurate Grinding of Tools**

These grinders are designed to meet the requirements of the manufacturer who desires a light grinder which will do accurate work, and at the same time does not wish to invest in a large and more expensive tool. The Dumore grinder can be quickly attached to lathes or other machine shop equipment. Their scientific construction entirely eliminates vibration and work done is accurate and free from chatter marks. Write to-day for descriptive literature.



**EQUIPMENT C**

Button Die Grinder. Speed  
50,000 R.P.M.



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General Tool Room use. Includes high-speed internal spindle. Reach, 2 inches: speed 30,000 R.P.M.; motor spindle speed, 10,000 R.P.M.



**EQUIPMENT B**

Deep Internal Work, 10-inch extension arm. Speed, 10,000 R.P.M.

**AIKENHEAD HARDWARE, LIMITED**

17 TEMPERANCE STREET, TORONTO

### RESEARCH IN METALLURGY

Scientific research in metals and their properties has made considerable progress during the last few years, and the results of the work done is startlingly shown in the proceedings at the annual meeting of the Institute of Metals, held in London.

A paper by Dr. Rosenhain describes the method of preparation of a number of copper alloys and gives the results of tensile and hardness tests carried out on them. The alloys were intended to meet very stringent requirements involving extensive cold-working, so that high tensile strength with great ductility was aimed at. The alloys dealt with fall into two main classes. The first class consists of alloys of copper with aluminum, with manganese, and with both aluminum and manganese. Difficulties were experienced in casting these alloys into slabs, and special methods of casting were adopted. A process sometimes known as "pressure casting" which has been developed and patented by Mr. F. Tomlinson, was eventually adapted for use with these alloys and proved very successful. In this method the liquid metal is forced, by means of externally applied air pressure, through a feeder tube dipping into the molten metal nearly to the bottom of the crucible and communicating with the bottom of the mold. Alloys cast by this method were subsequently rolled into strips. The results of tensile tests show that a very high degree of ductility can be obtained, together with considerable tensile strength, by the use of manganese. For example, the alloy containing 7 per cent. aluminum without manganese has a tensile strength of just under 40 tons per square inch, with an elongation of 17.5 per cent. in the "as rolled" condition, while after annealing it still has a tensile strength of 27.5 tons per square inch, and the remarkable elongation of 71 per cent. The second class consists of alloys containing no aluminum; these are mainly combinations of manganese and zinc, or nickel and zinc, with copper. They were cast successfully with the aid of borax as a flux, and were subsequently rolled into thin strips of excellent quality. Of this series the strongest alloy is that containing 3 per cent. manganese and 10 per cent. zinc, which, in the old rolled condition has a tensile strength of 47 tons per square inch, with an elongation of 3 per cent., and in the annealed condition a tensile strength of 23 tons per square inch, with 36 per cent. elongation.

The effect of work on the metals and their alloys has elicited considerable attention of late years and the variations in their physical and mechanical condition that result from the application of work have been very fully investigated. Hitherto the hard metals and alloys have received the closest attention, whilst such metals as tin and lead have scarcely been considered. This is unfortunate, since many of the phenomena with which one is confronted in the case of the cold-worked hard metals and alloys might, by much study, be rendered explicable.

The researches of Goerens and Webster

(among others) and of Alkins, in particular, have demonstrated that a very marked change in the physical and mechanical condition of the metals and their alloys is reached when the same have been deformed by certain well-defined amounts. Alkins, for example, has shown that when a copper bolt, previously annealed at 600 deg. C., and 9-16 in. in diameter, has been reduced in diameter about 29 per cent., it is so changed in condition that its ultimate strength in tension tends towards a constant value over a narrow range of reduction.

It has now been determined by Mr. Owen W. Ellis that the effect of cold-work upon a 39 per cent. zinc-copper alloy that he finds evidences of an inversion in the mechanical properties of the alloy in the neighborhood of 58 per cent. reduction in thickness of a strip. While the results of tensile tests of samples of the material that have been subjected to varying degrees of deformation are not of themselves conclusive, the results of Brinell hardness tests and of micrographic examination appear to afford satisfying evidence of a somewhat similar phenomenon to that recorded by Alkins.

An explanation of this peculiar change in condition is thought to be found in an extension of the law of annealing for strained metals and solid solutions propounded by Hanson at the last meeting of the Institute of Metals. This law stated that "for every degree of deformation there is a critical recrystallization temperature at which crystal growth is extremely rapid, and the size of the crystals produced by this rapid growth is the greater the smaller amount of deformation proceeding such annealing." This law appears to admit of the possibility of the temperature of the working of the metal or alloy coinciding with the "critical recrystallization temperature at which crystal growth is extremely rapid." It might even be inferred that the converse of the above law is true.

The process of cold work, viewed in the light of Reilby's theory, may be considered to result in the production of amorphous matter at the expense of the crystalline matter. It is suggested that there is at all stages of deformation a tendency for the reaction to take place, and that as the deformation to which the material has been subjected increases, so does this reaction continue, suffering a change in its rate when the critical degree or range of deformation has been attained. A graphic representation of these conditions results in the drafting of a curve representing the relation between the degree of deformation and the mechanical property which is almost identical in type to those obtained as a result of mechanical test.

A remarkable proof of the existence of the inversion in other alloys of copper is also afforded by the results of experiments made with a view to determine the power absorbed in the rolling of alloy strip. The power-reduction curves for 70-30 brass and for 20 per cent. nickel-copper for example, show most

sharply-defined changes in direction, these changes in direction appearing to vary according as the mass of the material to be treated is changed.

The above hypothesis as to the nature of the inversion in the property-deformation curves of the metals and alloys has been put forward, but no definite reason as to the cause of the inversion has been given. The processes of rolling and of drawing are such as result in the formation of a "strain gradient," to employ a term introduced by Jeffries, of most pronounced character within the materials undergoing deformation. As Jeffries has shown, a strain gradient produces a recrystallization gradient, and this, under proper temperature conditions, will produce exaggerated grain growth according to the germinative hypothesis. That the proper temperature conditions may be obtained, provided deformation is carried to sufficient extent, has, it is thought, been proved.

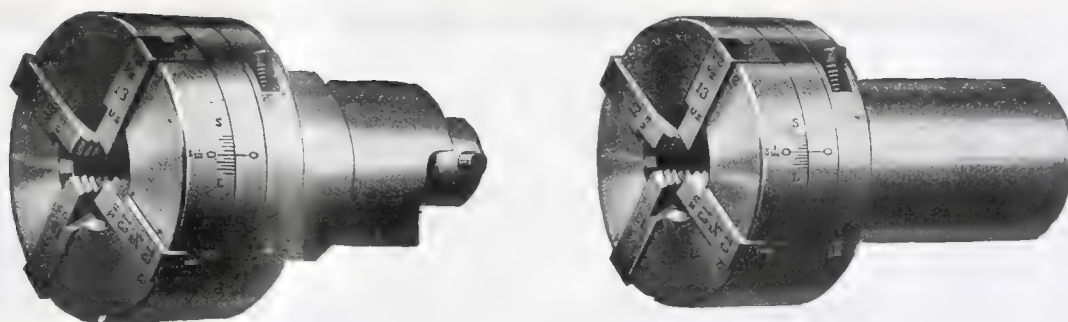
That these things are of intensely practical value must be patent to all and not to those concerned with the cold-working of metal alone. Both users and manufacturers of extruded rod, for example, have seen, not a few times, material showing very obvious signs of exaggerated grain growth. That this result may be obtained in the actual process of extrusion, given the correct conditions of temperature and of deformation, appears to probable rather than possible.

In conclusion, Mr. Ellis refers also to the exaggerated grain growth that may be produced as a result of stamping certain zinc-copper alloys—not, happily of the best types for general engineering work, within certain temperature ranges.

The tenacity-reduction curve shows a marked check in the rate of increase of tenacity at about 50 per cent. reduction in thickness, corresponding to the change of state, previously shown by Alkins to result from the progressive cold drawing of copper wire at a similar stage of reduction. There is a corresponding change in rate of decrease of percentage elongation and in rate of increase of scleroscopic hardness. The existence of another change at 80 per cent. reduction is suspected, as indicated by inflections in the tenacity curve, and the hardness curves. The scleroscope-hardness figures reach a maximum at this stage, but the auto-punch figures show a marked acceleration in the rate of increase.

A limited number of annealing experiments were carried out at temperatures of 600, 750 and 800 degrees centigrade, and the results point to incompleteness of softening of the severely worked strips as compared with the moderately-worked strips. The results of tensile tests, hardness test, and microscopic examination are in agreement, whilst scleroscopic tests on strips annealed at 750 deg. V., indicate the existence of a maximum at about 80 per cent. reduction. With the more severely worked specimens, after annealing, the strain structure on the polished and etched surfaces is visible without the aid of a microscope.





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When one uses the word "ONLY," he needs to be sure of what he is talking about. With confidence we use the word in saying that a Geometric Solid Adjustable Die Head, fitted with a set of milled dies, is the only solid die head that will back off without stripping the thread.

Geometric Solid Adjustable Die Heads may be fitted with either a releasing shank, plain shank, or with special shank for the Gridley Automatics. The releasing shank permits the head to disengage from the shank upon completion of the thread. The plain shank fits the head for use on the turret of a lathe or on a live spindle, such as a drill press.

Apart from the fact that it is not equipped with the self-opening feature or the roughing and finishing attachment, the Geometric Solid Adjustable Die Head is the same in principle and construction and will do equally as accurate work as the other styles of Geometric Die Heads.

**Whatever the requirements, there  
is a type of Geometric Die Head  
best adapted to the work.**

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**NEW HAVEN** **CONNECTICUT**

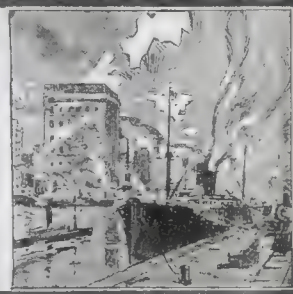
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# INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS  
PERSONAL AND TRADE NOTES



## TRADE GOSSIP

**Bond House Expands.**—The Atlas Bond and Security Corporation, which recently underwrote the securities of the Anglin Norcross Construction Company, has opened branches in Toronto and Ottawa.

**To Manufacture Fish Leather.**—An American firm has been looking over the ground in Kingston, Jamaica, with a view to establishing a tannery for fish hides. The skins used would be those of sharks and other non-sealy fish.

**Strike Thought Broken.**—The Mine Managers' Association has held a meeting with the executive committee of the proposed new union of miners. They did not give out any statement of what transpired, but it is generally thought that the back of the strike has been broken.

**Railway Shop Busy.**—The Leaside shops of the Canadian National Railway are pretty busy these days. There are about twenty locomotives in the shops for repairs besides several coaches. About 300 men are employed at present, and skilled mechanics are being taken on daily.

**Good Crop Prospect.**—The Ontario crop situation is very promising, according to the Ontario Commissioner of Agriculture. Crops in Northern Ontario are further ahead this year than they have been at the corresponding time in previous years.

**New Re-insurance Corporation.**—A new company known as the Re-Insurance Corporation, Ltd., has been incorporated in England with a capital of £500,000, the shares being of the par value of £1. The corporation is closely associated with the Yorkshire Insurance Company.

**New Toronto Factory.**—A new suspender plant is to be erected on Spadina Avenue between Adelaide and Richmond Street at an estimated cost of \$135,000. Mr. Henry Greisman, head of the King Suspender Company, is the interested party. The building will be of mill construction and be six storeys high.

**New Cable Line.**—As a result of the long-felt dissatisfaction with the Pacific cable service between the U. S. and Japan, a group of Japanese business men are floating a company with a capital of about \$25,000,000 for laying a new cable line. American capital will likely be enlisted as well as Japanese.

**Guelph Industry Expands.**—The International Malleable Iron Company of

Guelph have called for tenders for the construction of a new machine shop and warehouse. The building will be one storey in height and will be 189 feet by 120 feet, of concrete and brick, and will cost about \$33,000. The architect is W. A. Maloney.

**Motion to Wind Up.**—A number of the shareholders of the Imperial Steel & Wire Company having made an application for the winding up of the company, Mr. Justice Kelly has adjourned the application to September 11th. In the meantime he has appointed Mr. G. T. Clarkson to make an examination into the affairs of the company.

**Good Roads Movement.**—It is understood that the Government is about to appoint an honorary advisory board which would assist the Department of Railways and Canals in its work for good roads. The personnel of the new board is stated to be made up of the following gentlemen: Mr. C. A. Magrath, late fuel commissioner; J. P. Mullarkey, of Montreal, and Mr. Home Smith.

**Kingston Wants Elevators.**—Kingston is going to make a bid to be the grain transshipment port in place of Port Colborne. The city council is going to urge the Dominion Government to build large elevators there. They point out that it will take two years to rebuild the elevator at Port Colborne and by that time the Welland Canal will be finished and Kingston will be the logical point for the steamers to bring their grain cargoes.

**Pulp Mill Changes Hands.**—The Aroostook Pulp and Paper Mill, which has been closed for some weeks, will be taken over and operated by a new company. The plant was built in 1917 and is well equipped, having a daily capacity of 60 tons, and employing about 200 men. The interest has been purchased by Mr. Gould and H. B. Stebney of Boston, and the plant will soon be in full operation and eventually will be extended. Mr. A. R. Gould, the president of the new company, is well known through his connection with the St. John Valley Railway.

**New Welland Measurements.**—The Department of Railways and Canals has issued a report on the alterations to the Welland Ship Canal. Its present length is 26½ miles and comprises 25 lift locks, the dimensions of which are 270 feet by 45 feet, with a depth of water on the sills of 14 feet. The proposed canal will be 25 miles long, and the number of locks will be reduced to seven. These

locks will be 800 feet in length by 80 feet in width in the clear, and the depth of water on the sills at extreme low water in the lakes will be 30 feet. The width of the canal at bottom will be 200 feet, and for the present the canal reaches will only be excavated to a depth of 25 feet.

**Salving Port Colborne Grain.**—It is understood that practically all the grain which was stored in the destroyed elevator at Port Colborne, owned by the United States Government, will be saved. It will be shipped to Montreal for transshipment overseas. In connection with this, a meeting was held in Montreal between the Harbor Commissioners, the Railway Board and the city Administrative Commission, when it was decided to put in two extra tracks on the harbor front to handle the extra grain. It was estimated that some 60,000,000 bushels would be shipped to Montreal from Port Colborne.

**Airplane for Morrisburg.**—Handley-Page, Ltd., have secured a Dominion charter to engage in a general aeroplane business in Canada. The capital stock will be \$2,500,000, and the head offices of the company will be at Morrisburg, Ont. The directors named are William Harold and Admiral Mark Kerr, London, Eng.; Harry Clark, Montreal; Fred Chalmers and W. H. Gannon of Morrisburg.

**Bridge Destroyed by Fire.**—The forest fires that are sweeping Deer Lake have destroyed the C. N. R. bridge between Deer Lake and Burger. The C. N. R. trains are using the C. P. R. tracks for their through traffic. The local service is completely tied up. Alarm is felt for several families of settlers of whom no word has been heard for some days.

## PERSONALS

Mr. M. W. Ferguson, who has been in the employ of the city of St. Thomas for the past six years as city engineer, has resigned his position.

Mr. D. A. R. McCannel has been appointed city engineer for the city of Regina. He has been in the service of the city since 1911, and for the past two years has been acting city engineer.

Mr. M. L. Cantell, C.E., has been elected a member of the Royal Society of London, England, according to recent advices. Mr. Cantell is a Provincial Government engineer of Manitoba, and resides at St. Boniface.



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The DUMORE grinder will  
mean better dies and gauges  
for us. I'll order one today."*



**T**O every shop making its own gauges, jigs or dies the DUMORE grinder has real significance. If you are looking for less trouble and greater accuracy in your grinding of hardened tools you will find the means right here.

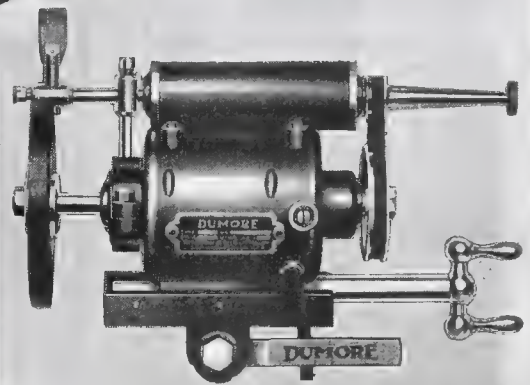
Chatter-marks, taper and bell-mouth are eliminated through the use of a DUMORE. And the two reasons for this lie in the high spindle speed and dynamic balance of the armature. Even small wheels are thus given the correct cutting speed without a possibility of vibration. The DUMORE grinder is light and portable—easily carried from one part of a shop to the other and quickly set up on a lathe, shaper or milling-machine.

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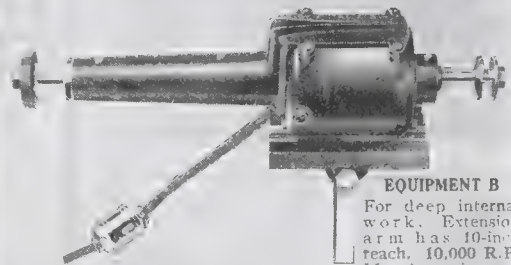
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**EQUIPMENT A**

For general tool room use. Includes High Speed Internal Spindle A with reach of 3 inches. 30,000 R.P.M. Comes fully equipped. Weighs 17½ pounds.



**EQUIPMENT B**

For deep internal work. Extension arm has 10-inch reach. 10,000 R.P.M. Arm interchangeable with internal spindle on Equipment A.

# DUMORE HIGH SPEED GRINDERS



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FOR SHIPYARDS ETC

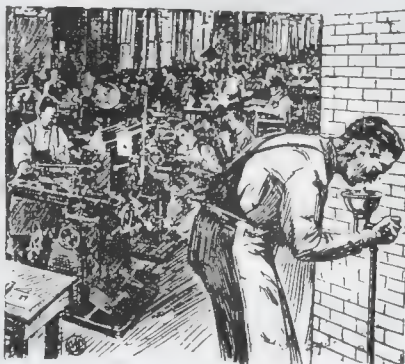
## TENDERS

The Patricia Mining Company, Boston Creek, are in the market for equipment for mining and mill plant.

Tenders will be received up till August 25 for bridges and culverts of concrete in the township of York. Plans and specifications can be seen at the office of the township engineer, Frank Barber, 40 Jarvis Street, Toronto.

The School Commissioners of Halifax, N.S., are asking for tenders, which will be received till August 30 for the erection of four new school houses, complete with heating and electric plant. For information apply S. J. Wilson, secretary, School Commissioners' Office, Halifax.

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The Board of Education of Peterborough are asking for tenders for a public school. Tenders will be received up to September 1 and plans and specifications can be obtained from W. & W. R. L. Blackwell, architects, Room 17, Bank of Commerce Building, Peterborough, or Melvern F. Thomas, 229 College Street, Toronto.

The Toronto Board of Education are asking tenders for an addition to Keele Street School. Tenders open till August 27. Specifications and information can be obtained at the office of Messrs. Chapman & Oxley, Harbor Commission Building, Toronto. Tenders will also be received by the same authority for addition to the Duke of Connaught School, Morley Avenue, and specifications can be obtained from the architect, Mr. J. Siddall, 250 Confederation Life Building, Toronto.

## MARINE

**Washington.**—The United States War Department has announced the assignment of four of the fastest transports to the mail service between New York and Brest. The four vessels will be the George Washington, Leviathan, Agamemnon and America. The Shipping Board has now received 3,000,000 tons of shipping from the army authorities.

**Sydney, N.S.**—The huge Bayley raft, which was being towed over to Europe by the ocean-going tug Humber, broke adrift in a heavy gale off the coast. The tug has arrived in Sydney with part of the raft, and will proceed to sea to pick up the other part immediately. The raft has been ready for sea for the last two years, but owing to war conditions could not be taken across.

**Port Stanley.**—A diver is to be sent down to examine the hulk of the vessel discovered between Port Stanley and Rondeau. This is thought to be the wreck of the car ferry Bessemer, for which an unsuccessful search has so long been kept up. Pieces of the wreck were pulled up as much as two hundred feet apart, and this inclines the captain of

## VICTORY CELEBRATION

### EXHIBITION

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Aerial exhibition in enemy machines by Cols. Barker, Bishop and other famous aces.

Gorgeous spectacle—Festival of Triumph—1,500 performers.



the searching tug to the opinion that he has at last discovered the missing vessel.

**New York.**—Word was received by wireless here that a collision had taken place off the Jersey coast between the outbound United States Shipping Board steamer Point Judith and the Norwegian steamer John Blumer. The John Blumer returned to New York in tow. The Point Judith was built by the Shipping Board last year, and is a vessel of 1,699 tons. The John Blumer is owned by C. H. Sorensen, and was built in 1914 and registered 1,481 tons.

**Vessel Tears Out Gates.**—The steamer Aztec, of Buffalo, while entering Lock 17 of Cornwall Canal, snapped a rope, and the way on the vessel caused her to push open the lock gates. The result was to put the lock in communication with the high level water, which rushed in and tore the gates away completely. The resulting flooding of the surrounding country resulted in the drowning of a boy who was on the bank, and two companions had a narrow escape of sharing his fate. They saved themselves by climbing a telegraph pole.

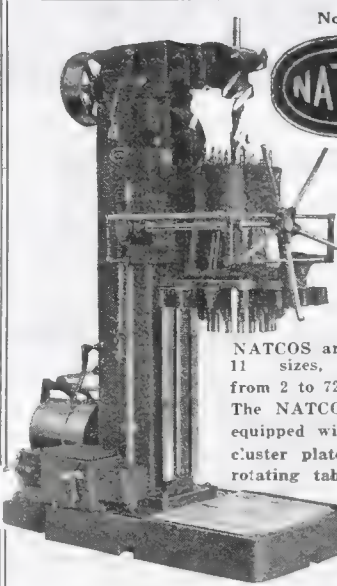
## OBITUARY

The death occurred recently at the residence of his father, 676 Shaw St., Toronto, of Edmund F. Bradley. Death was due to heart failure. Mr. Bradley was local manager of the Erie City Iron Works.

From Saranac Lake, N.Y., comes the announcement of the death of Mr. Wayland Williams, of Laurie & Lamb, engineers, Montreal. Mr. Williams, who was 52 years of age, was at one time connected with the famous old Laurie Engine Works.

Mr. Samuel G. Lester, who was

master mechanic of the Dominion Bridge Company, Ltd., died suddenly at the Royal Victoria Hospital, Montreal. He was 43 years of age, and for twenty-one years had been in the employ of the Bridge Co. He is survived by a wife and one daughter. He was a son of the late William Lester, of Toronto.



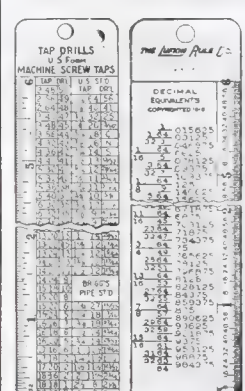
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## SECTION

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**DRAFTSMAN**—A FIRST-CLASS MECHANICAL Draftsman experienced on Automatic Machines, Jigs and Fixtures for small interchangeable work; also a Junior Draftsman, must be a good penman. Permanent positions with good opportunity for advancement. Apply by letter or in person to The Singer Manufacturing Co., St. Johns, P.Q. State age, experience and salary expected. (c4m)

**WANTED**—MAN AS SHOP ASSISTANT TO Master Mechanic in a large manufacturing plant. Must be familiar with modern shop practice, capable of installing machinery to the best advantage, and completing the work speedily. Good opportunity for an energetic man. State experience, age, salary, etc., in first letter. Box 616, Canadian Machinery. (c4m)

### WANTED

**WANTED**—ONE WATCHMAN'S CLOCK, SIX station, in good repair and slightly used. Box 620, Canadian Machinery.

## NOW!

You've been going to send in that ad for weeks, so why not mail it now for next week's issue.

### Canadian Machinery

43-53 University Ave., Toronto

One of the things we all do well is to forget.

Names that were household words yesterday are gone to-day.

Because people knew your Name and your Line a year ago it is no sign they do to-day. They forget easily.

Keep yourself in the public mind by advertising. It is just as important to make old friends remember as it is to win new friends. Advertising does both.

### AGENCIES WANTED

**WANTED**—AGENCY OF SPECIALTIES FOR hardware factories and mills for Quebec city and district. Best connections and references. Reply to G. A. Vandry, 28 St. Joseph St., Quebec. (c8m)

### MACHINE WORK WANTED

**MACHINE WORK WANTED FOR LATHES,** shapers, milling machine and planer, etc. Hourly or contract basis. Prompt delivery. W. H. Sumbling Machinery Co., Toronto. (ctfm)

### PATTERNS

**TORONTO PATTERN WORKS,** 65 JARVIS Street, Toronto. Patterns in wood and metal for all kinds of machinery. (cfm)

**BRANTFORD PATTERN WORKS ARE PREPARED** to make up patterns of any kind—including marine works—to sketches, blue prints or sample castings. Prompt, efficient service. Bell Phone 631; Machine Phone 733. Brantford Pattern Works, 49 George St., Brantford, Ont. (ctfm)

## PATENTS FOR SALE

Two Canadian Patented Steam Specialties for sale; one Steam Trap, Patent Number 187215, and one Steam Separator, Patent Number 183340.

### Allentown Experimental Works

Allentown, Pa., U.S.A.

### DRAIN TENDERS WANTED

Tenders will be received by the undersigned Commissioners up till 2 o'clock p.m. Saturday, the 26th day of July, 1919, for the repair to the 3-4 Sideroad and 8-9 Concession drain, in the Township of Brooke, County of Lambton. Estimate cost of excavation, \$9,600. Contractors must furnish security for the completion of the work. Plans and specifications may be seen at the office of the Clerk, Lot 16, Con. 9, Brooke Township. Lowest or any tender not necessarily accepted.

L. LINDSAY, R.R. No. 2, Alvinston.  
C. ATKIN, R.R. No. 1, Inwood.  
Commissioners. (c4m)

### FOR SALE

**17 ATLAS HORIZONTAL TUBULAR BOILERS** (Babcock & Wilcox), 60 inch by 16 feet with Jones Underfeed Stokers. Dominion Sugar Co., Limited, Chatham, Ont. (c8m)

**FOR SALE**—FINE BIG ENGINE LATHE about 90" x 30 ft. Box 619, Canadian Machinery.

### BOILERS FOR SALE

**ALL IN EXCEPTIONALLY GOOD CONDITION.** 17 Atlas Horizontal Tubular Boilers (Babcock & Wilcox), 60 inch by 16 feet, with Jones Underfeed Stokers; boilers lying at Kitchener. One 350 H.P. Erie City Boiler. Four 250 H.P. Scotch Marine Boilers with wet heads, now lying at Wallaceburg plant. Dominion Sugar Co., Limited, Chatham, Ontario. (c8m)

### SITUATION WANTED

**MECHANICAL ENGINEER AND DRAUGHTSMAN,** with experience in dredging, hoisting and general engineering open for position. Box 617, Canadian Machinery. (c9m)

**WANTED**—POSITION AS TOOL ROOM OR machine shop foreman by man of ability; good references. Apply Box 618 Canadian Machinery. (c9m)

### WHEN WRITING ADVERTISERS KINDLY MENTION THIS PAPER

## WANTED

1—"Used" Plate Punch and Shear 36" gap, capacity 7/8" hole in 7/8" plate

—also—

1—"Used" Air Compressor, steam actuated—compound steam—simple air—12" x 12" cylinder.

Both machines must be modern in design and in good operating condition. Offers with full details, price and shipping point, will be considered.

### I. MATHESON & CO., LTD.

Builders of Machinery

New Glasgow, - Nova Scotia



# In the Machinery Hall at the Canadian National Exhibition

*We will have on exhibit and in operation*

Type A & B Briggs Manufacturing Milling Machines.  
 Steptoe Single Pulley Drive 24" Shaper.  
 Bath No. 2 Universal Grinder.  
 Fitchburg 8 x 36 Cylindrical Grinder.  
 Conradson Heavy Duty No. 3 Plain Milling Machine, Single Pulley Drive.  
 Thor Pneumatic and Electric Tools.  
 Adams Short Cut Lathe.  
 Lodge & Shipley 24" Three Step Cone Engine Lathe.  
 Sliding Head, Back Geared and Sensitive Drills.  
 Hardinge Bros., Inc. ("Cataract"), No. 7 Turret Tool Post Lathe.  
 Quick Change Precision Lathe.  
 R 4 Underdrive Bench outfit, equipped with Nos. 3, 4, and 5 Precision with screw cutting and grinding attachments.  
 Bench Miller and Drill Press.

Experts from the factories will be on hand to demonstrate machines and answer all enquiries.

You are cordially invited to call at our booth and inspect this machinery.

**GARLOCK-WALKER MACHINERY COMPANY, LIMITED**

32-34 Front St. West, Toronto

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TORONTO

WINNIPEG

## FOR SALE

### BOILERS

- 4—H.R.T. Boilers, 100 H.P. 125 lbs. W.P.
- 1—Locomotive Boiler, 150 H.P., 120 lbs. W. P.

### TRANSFORMERS

- Single phase, 60 cycle, 2200—220—110 volts.
- 6—15 KVA Type H. C. G. E.
- 2—15 KVA Allis-Chalmers.
- 4—10 KVA Type H. C. G. E.
- 4—10 KVA Allis-Chalmers.
- Single phase, 60 cycle 2200—550 volts.
- 3—125 KVA Pittsburg.
- 3—300 KVA Pittsburg.

### MOTORS

- 3 Phase, 25 Cycle, 550 Volt.
- 4—10 H.P. 720 R.P.M.
- 3—15 H.P. 720 R.P.M.
- 6—20 H.P. 720 R.P.M.
- 2—25 H.P. 720 R.P.M.
- 4—30 H.P. 720 R.P.M.
- 2—40 H.P. 720 R.P.M.
- 1—100 H.P. 480 R.P.M.
- 3 Phase, 60 Cycle, 550 Volt.
- 2—10 H.P. 900 R.P.M.
- 2—20 H.P. 900 R.P.M.
- 2—50 H.P. 900 R.P.M.
- 3 Phase, 25 Cycle, 440 Volt.
- 3—60 H.P. 720 R.P.M.
- 1—75 H.P. 720 R.P.M.
- 1—100 H.P. 720 R.P.M.
- 4—200 H.P. 480 R.P.M.

### TIME CLOCKS.

- 6 International Daily Card Clocks.

**C. P. Wilson Company**

509 LUMSDEN BUILDING  
 TORONTO, ONT.

## PARTIAL LIST OF TOOLS

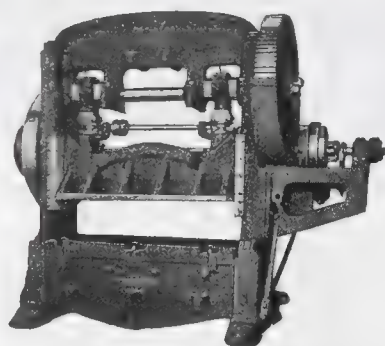
- 2—60" Bullard Vertical Boring Mills
- 1—60" Niles Vertical Boring Mill
- No. 4—B. & S. Plain Miller
- 1—36" x 36" x 8' Gray Planer, two heads
- No. 3—Cincinnati Universal Miller
- 5—No. 0 Steptoe Hand Millers
- 13" x 5' 6" New Carroll-Jamieson Quick-Change Lathe
- 14" x 6' New Carroll-Jamieson Quick-Change Lathe
- 15" x 6' New Sidney D.B.G. Quick-Change Lathe, swing 17"
- 15" x 8' New Sidney D.B.G. Quick-Change Lathe, swing 17"
- 17" x 8' New National Quick-Change Lathe
- 3—17" x 8' New Sidney D.B.G. Quick-Change Lathe, swing 19"
- 17" x 10' New Sidney D.B.G. Quick-Change Lathe, swing 19"
- 18" x 24" New Rahn Larmon Lathe, D.B.G. Quick-Change
- 19" x 10' New Sidney D.B.G. Quick-Change Lathe, swing 21"
- 9—19" x 8' New Sidney D.B.G. Quick-Change Lathe, swing 21"
- 25" x 14' New Sidney D.B.C. Quick-Change Lathe, swing 27"
- 33" x 14' Putnam, arranged for Motor Drive
- 6' Western Radial Drill
- 5' Bickford Single Pulley Drive Radial
- 100-lb. New Little Giant Hammer
- 50-lb. New Little Giant Belt Hammer
- 25-lb. New Little Giant Belt Hammer
- 30-ton Watson & Stillman Hydraulic Press

**FRANK TOOMEY INC.**

27 North Third Street

PHILADELPHIA, PA.

## The "Toledo" Double Crank Presses



Simple, sturdy, efficient, embodying exclusive features that have been developed through nearly half a century of intensified study and experience. Sup-

plied in over 250 sizes to cover practically every requirement of general sheet metal and drop forged work.

Let our engineers solve your press and die problems — we will guarantee results.

**The Toledo Machine & Tool Co.,**  
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**Representatives:** Allied Machinery Co. of America, 19 Rue de Rocroy, Paris, France; Via XX Settembre 12, Turin, Italy, 16 Seidengasse, Zurich, Switzerland.

## Special Equipment

Built to  
Specification

Steel Plate  
and Structural  
Steel Work

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High Quality  
and  
Prompt Service  
Double Sure

Write for  
Full Particulars

**WILLIAM HAMILTON CO., Limited**  
TORONTO - ONTARIO

# WILKINSON & KOMPASS

TORONTO HAMILTON WINNIPEG

## IRON AND STEEL HEAVY HARDWARE

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# SHAFTING

Cold Drawn, Turned and Polished Steel,  
Rounds, Squares, Hexagons and Flats,  
Steel Piston Rods, Pump Rods.

Special facilities for Keyseating up to 6 in. diameter.

THE  
**Canadian Drawn Steel Co.**

HAMILTON

LIMITED

CANADA

## SMELTERS & WELDERS GOGGLES

*We have a style to meet every requirement*



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**Consolidated Optical Company**

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Toronto

Winnipeg

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## IT IS IMPORTANT

when advertising that as many prospective buyers as possible read what you are selling. We advise you to use **Canadian Machinery.**



# Thor

## Electric Drills and Grinders

The only Electric Tools equipped throughout with ball and roller bearings.

**Light, Powerful and Durable.**

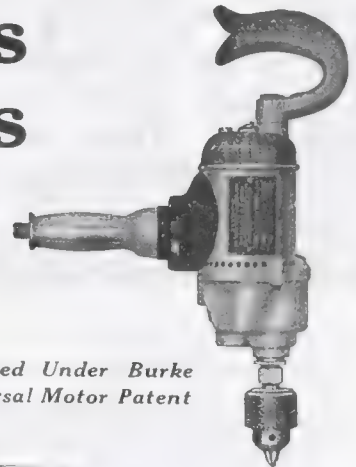
Thor Electric Tools have off-set spindles—which permit operating in close quarters—a variety of speeds, S K F Ball Bearings, four contact switches, D.C. or Universal Motors and several other features that make them the super-tools of the day. Jacobs Chucks used as Regular Equipment.

### PORTABLE ELECTRIC GRINDER

Equipped with Universal Motor for Operating on Direct or Alternating Current  
110 TO 250 VOLTS



*Licensed Under Burke  
Universal Motor Patent*



It will pay you to put them to the test and let them prove that they'll reduce your production cost.

**For Full Particulars Write—**

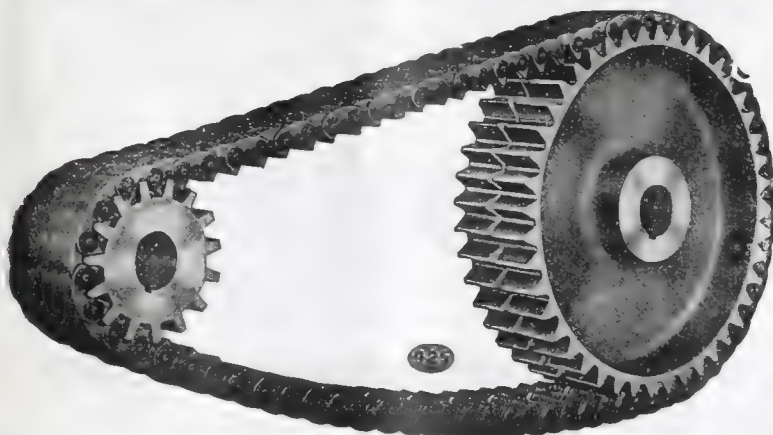
### Independent Pneumatic Tool Company

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## Jones & Glassco (Reg'd)

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MONTREAL AND TORONTO

Specialists in

**POWER TRANSMISSION CHAINS**

CANADIAN AGENTS FOR

**"RENOLD"**

Patent Silent and Bush Roller Chains

**"MORSE"**

Rocker Joint Silent Chains

Chain Drives from ¼ H.P. to 5000 H.P. in successful operation

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**FROM COAST TO COAST**

As time-savers there are none equal to our Wiping Solder, Bar or Wire Solder.

Hoyt Lead Traps, bends and waste pipe are in a class by themselves.

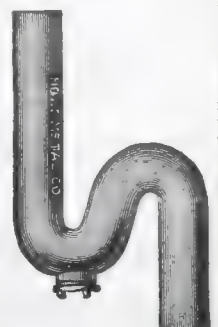
All our products are made to formula.

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**HOYT METAL COMPANY, TORONTO, ONTARIO**

**New York, N. Y., London, Eng., St. Louis, Mo.**



# SPECIAL MACHINERY

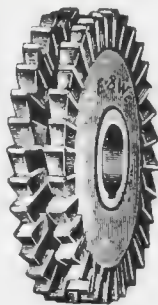
Special Machinery, Jigs, Fixtures, Punches and Dies, Small Tools, Screw Machine Products, Gauges, Forgings, Etc.

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We manufacture the following tools, etc.

Standard and Special Milling Cutters of all descriptions, Gear Cutters, Hand Reamers, Shell Reamers, Chucking Reamers and Taper Pin Reamers, Lathe Mandrels and Arbors, Metal Stamping Dies, Gauges, Jigs and Fixtures, Etc.

All equipment required for rapid and economical production of interchangeable parts. Prompt attention to all work.

ASK FOR OUR NEW CATALOGUE No. 10.

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Electric, Thermit and Oxy-Acetylene Welding

Telephone us and we'll be on the job by NEXT train with our Portable Oxy-Acetylene Outfit and Skilled Mechanics. We're always ready.

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Maritime Branch  
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WE CARRY

## High Speed Reamers, Cutters and Drills

IN STOCK HERE

Prompt Service

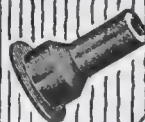
### The J. A. M. Taylor Tool Co.

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We have the equipment to make the tools and produce the stamping. Let us quote on your requirements.

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The REGO 100% Efficient Welding Torch

Saves Oxygen Eliminates Flash-Back Better Welding

Write to us for anything and everything you need.

### WELDING & SUPPLIES COMPANY

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CASTINGS FORGINGS

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is used by the Largest Manufacturers in the Gear Industry.  
Catalog and Engineering sent to those interested.

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"Red Hot" Torches

## Machine Shop, Foundry and Construction Supplies

In addition to the tools shown, our line includes Set Screws, Cap Screws, Machine Screws, High Speed and Carbon Drills, Files (extra large stock) and a complete line of machinists' tools (Starrett, Brown & Sharpe, etc.).

We also carry a heavy stock of Bar Iron, Sheet Iron (black and galvanized), Machine Steel, Cast Steel, High Speed Steel, Cold Rolled Steel, etc.

Pleased to quote prices and time of delivery.

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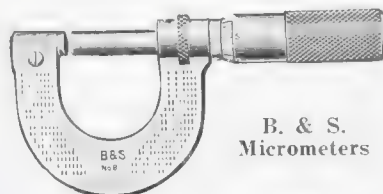
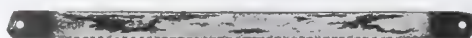
Established 1847

19 Victoria Street

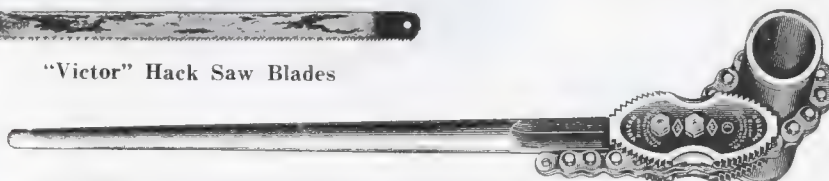
TORONTO, ONT.



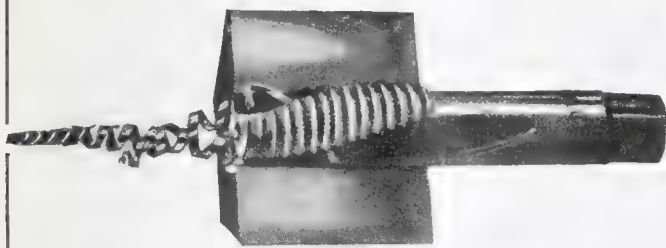
Machinists' Tool Chests

B. & S.  
Micrometers"Vulcan"  
Pipe Vises  
and  
Pipe Wrenches

"Victor" Hack Saw Blades



## THE "SEMPL" TAP



(Patent Applied For)

### A SCIENTIFICALLY CORRECT CUTTING TOOL

*makes tapping a pleasure*

The Most MODERN,  
The Most EFFICIENT,  
The Most ECONOMICAL.

Send for a "SEMPL" Sample Tap. Made in any thread  
Special Taps for blind holes.

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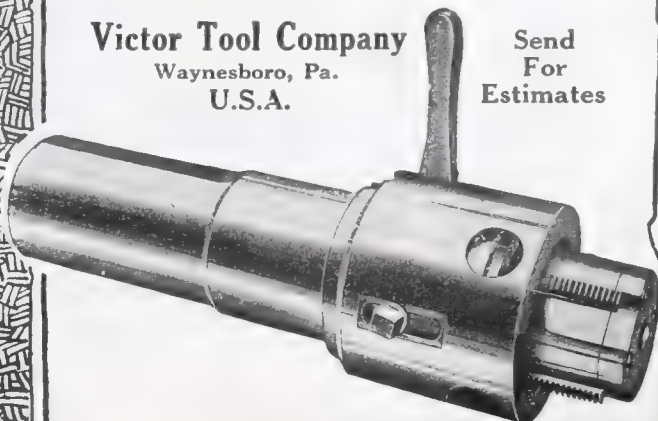
We wanted  
something original—  
this is what we got

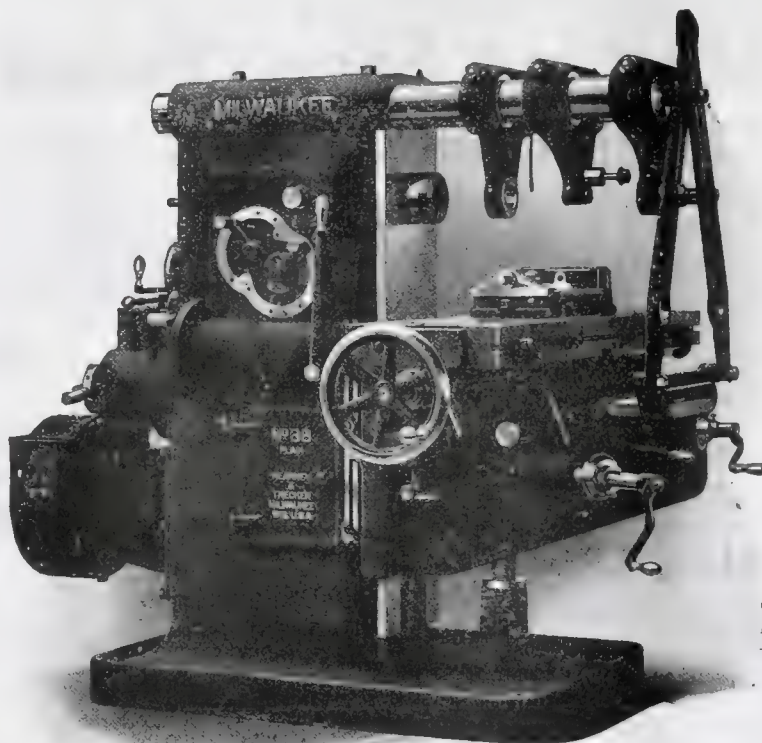
BOTH in these operations and half another — I'll show you later — completed in the time our old taps took to do one; that, I guess, is why we continue to use your Victor Collapsible Taps."

It was the often-heard story of time saved, of costs lowered, of all threads clean and smooth. And it was pleasant to hear.

Victor Tool Company  
Waynesboro, Pa.  
U.S.A.

Send  
For  
Estimates





## MILWAUKEE MILLING MACHINES

### **Double Overarm maintains alignment.**

It is impossible for the operator to place the arbor supports on the arbor and double overarm in any other way than in line. Arbor cannot be pounded out of line when using large, coarse pitch cutters on rough, heavy work.

### **Other Distinctive Milwaukee Features:**

Solid top knee—hardened steel gearing and shafts in the column and feed box—automatic flooded lubrication—one and one-half gallons of oil per minute pouring over all gears and bearings in the column and feed box, insuring lubrication at all times—flanged spindle with hardened steel collar for driving arbors—constant speed drive, reverse being self-contained.

*Send for our No. 21 Catalogue. Illustrating and describing Milwaukee Milling Machines and accessories in detail*

**KEARNEY & TRECKER CO.**  
**MILWAUKEE, WIS. U.S.A.**



# FINISH

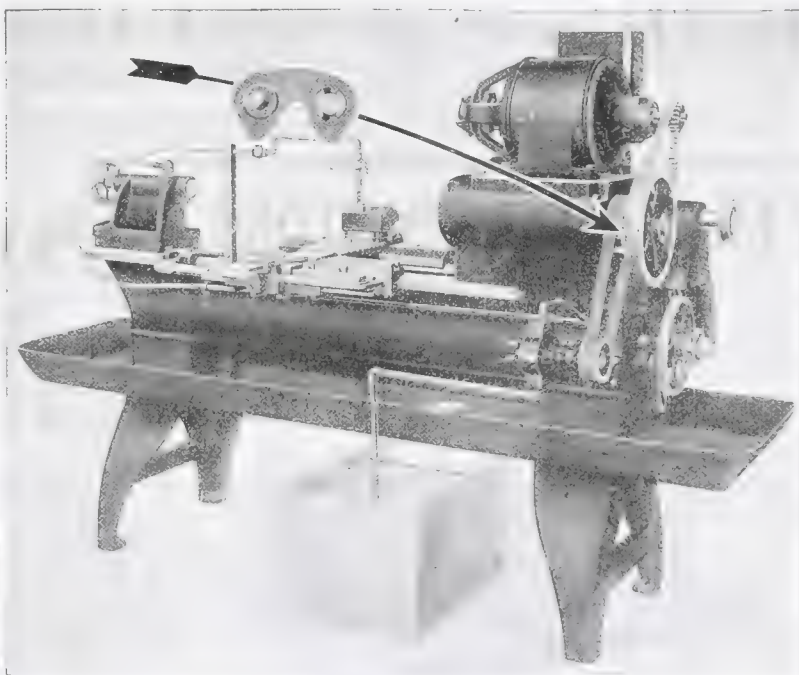
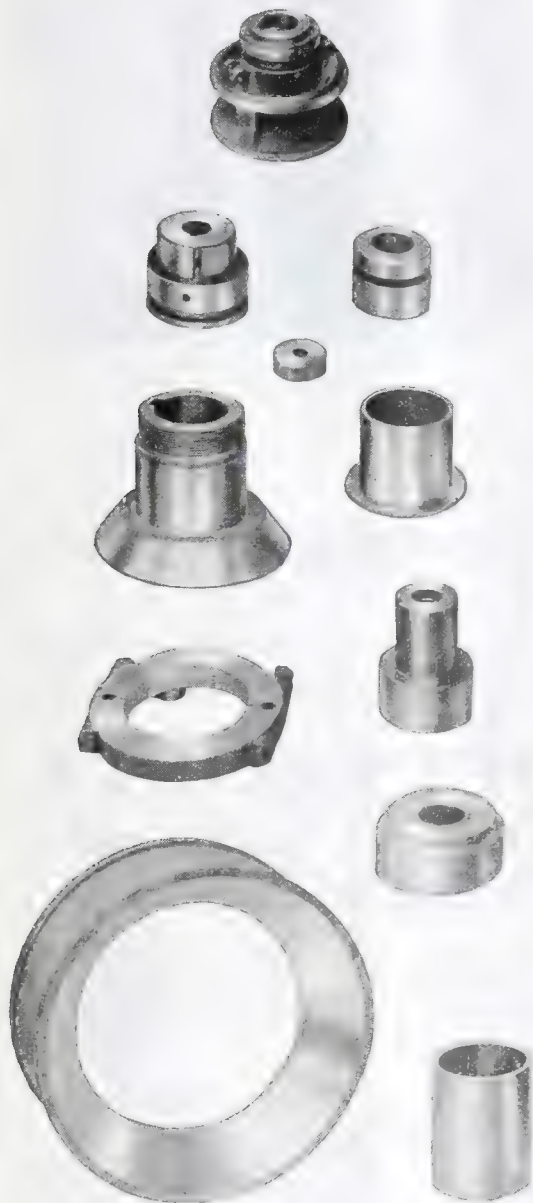
## And Link-Belt Silent Chain Drives

THESE illustrations show some recently-completed parts machined on tools driven by Link-Belt Silent Chain Drives. In reproducing them in halftone it is impossible to show the smooth, even finish on each part just as it left the machine tool—But

Like all other parts completed on machine tools driven by Link-Belt Silent Chain Drives, these parts are smooth and clean cut, without chatter marks. Write for booklet No. 312 describing Link-Belt Silent Chain—the efficient drive for machine tools.

CANADIAN LINK-BELT COMPANY  
LIMITED

1 WELLINGTON AND PETER STREETS, TORONTO



# LINK-BELT

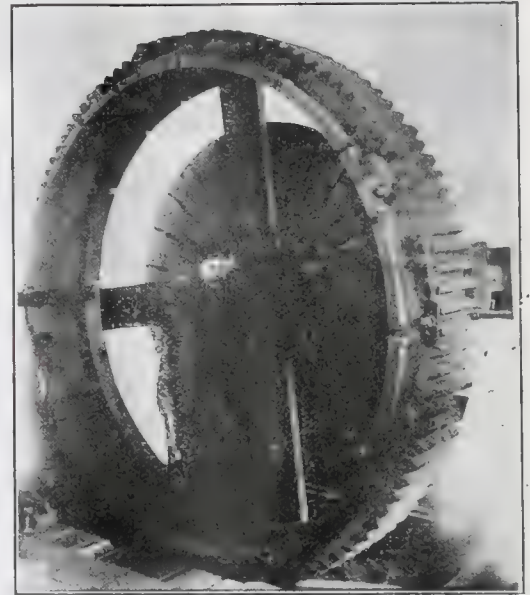
## SILENT CHAIN DRIVES



# Economy A Big Factor In "HISCO" Moulded Gears

In the installation of new machinery in the working out of new processes—you may require gears or sets of gears, and no matter what the diameter, the Hesco process relieves you of the necessity of having patterns made—entailing considerable cost and delay.

"HISCO" machine moulded gears, while requiring no pattern, insure accuracy, dependability, quality, and the price is minus the cost of patterns—which in these days of high lumber and wages, and when time is a factor—is something to be considered.



The "HISCO" plant is equipped to produce machine moulded gears up to 18 feet in diameter without patterns—and remember, very often the pattern has cost more than the gears.

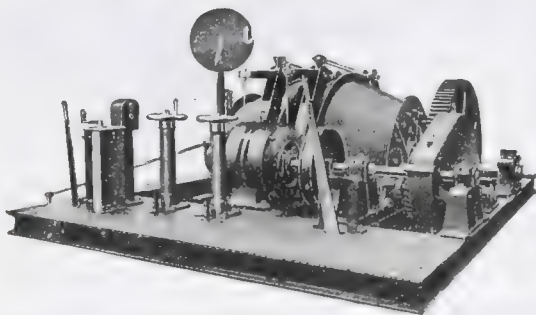
**HULL IRON & STEEL FOUNDRIES, LIMITED**  
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## LANCASHIRE MOTORS

HAVE WORLD WIDE REPUTATION

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**Specialists in Motor  
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Plastic Metallic Packing for Piston Rods  
and Valve Stems.

Paxton & Mitchell Locomotive Rod Pack-  
ing.

Rapid Hose Coupler, for all Hose Con-  
nections.



*Write or Wire Your Requirements*

**International Machinery and  
Supply Company, Limited**

371 St. James St., Montreal





# The City of St. Catharines

TO the manufacturer seeking an ideal location for a factory site the City of St. Catharines offers indisputable advantages. Cheap power, convenient shipping facilities and plenty of high-grade labor are features of St. Catharines as a manufacturing centre. The city offers liberal inducements to machine, iron and metal working concerns which are worthy of investigation.

## Facts about St. Catharines

**CHEAP POWER**—City owns Hydro-Electric Light and Power System; rates exceptionally low. 60,000 H.P. development of the Dominion Power & Transmission Co., Ltd., two miles south of the city with local distribution system.

**TRANSPORTATION**—Situated on C.N.R., G.T.R. and Welland Canal. Dominion Express and Canadian Express in operation. Steamer line to Toronto. Electric railway line to Niagara Falls, Welland, Port Colborne, Niagara-on-the-Lake, Port Dalhousie, Merriton and Thorold.

**LABOR**—Building of Workingmen's houses is an outstanding feature of St. Catharines. The city has a good class of contented labor and has as a rule been remarkably free from labor troubles.

**SPECIAL INDUCEMENTS**—The city is prepared to co-operate with new concerns and offers attractive inducements to all worth-while industrial projects.

**GENERAL**—Population, 19,500. City has up-to-date street railway, electric, gas, water, and sewage system. Centre of Niagara fruit belt. Industrially the district now includes principally metal industries and pulp and paper mills, several silk, woollen and hair cloth factories, auto tire and rubber footwear industries, and numerous industries connected with the fruit products of the district.

Write to the secretary of the Board of Trade for full information about the City of rare opportunities. Enquiries gladly answered.

Unlimited  
Hydro Power  
at the  
Lowest  
Rate in  
CANADA

Boat  
Connection  
With  
Great  
Lake  
Ports

Grand Trunk  
Railways  
and  
National  
Railways

60% of  
employees  
own their  
own homes

Excellent  
Schools

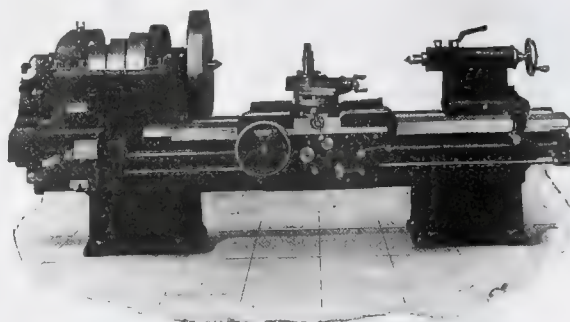
Convenient  
to important  
Centres in  
Canada and  
United States



*Sidney  
for  
Service*

Sidney-for-Service Lathes are noted for their power and rigidity. Take deep cuts through toughest metal without pause or chatter.

*Heavy  
Duty  
Engine  
Lathes*



Specifications include 3-step cone, double back gear, semi-quick change gear lathe, built on 10 ft. bed. This lathe also furnished with quick-change gears. Bed lengths available: 10, 12, 14, 16, 18 and 20 feet.

The Sidney Line comprises 15-inch, 17-inch, 19-inch, 25-inch, 27-inch, 30-inch and 36-inch lathes, which are adaptable to the finest tool room work or the heaviest duty shipyard or factory rapid production work.

**The Sidney Tool Company, Sidney, Ohio**

Canadian Agents: The Geo. F. Foss Machinery & Supply Co., Montreal, Quebec. H. W. Petrie, Limited, Toronto, Ontario.

# STEEL TANKS

THE  
**TORONTO IRON WORKS**

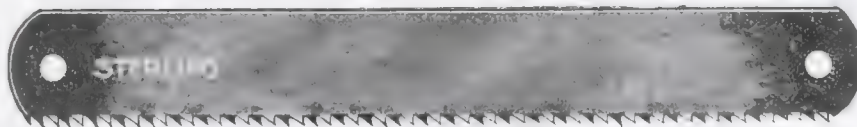
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ROYAL BANK BLDG.

LIMITED  
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WORKS:  
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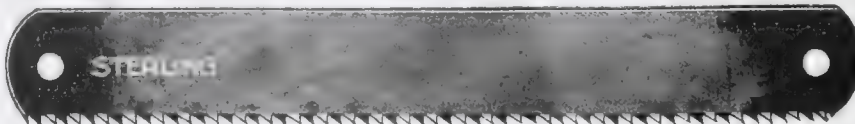
Oil Storage, Gasoline Tanks, Air Receivers, Pneumatic Water Supply Tanks, Smoke Stacks, Boiler Breeching, Riveted Steel Pipe, Bins and Hoppers. Heavy and light steel plate construction erected anywhere.

## "STERLING" Hack Saw Blades



Guarantee satisfaction. A trial will convince you of their superiority.

Insist on securing the  
"STERLING" Brand.



Manufactured by

**DIAMOND SAW & STAMPING WORKS, BUFFALO, N.Y., U.S.A.**



## **BATH Universal Manufacturing Grinders**

*built by*  
**Universal Grinding Machine  
Company**

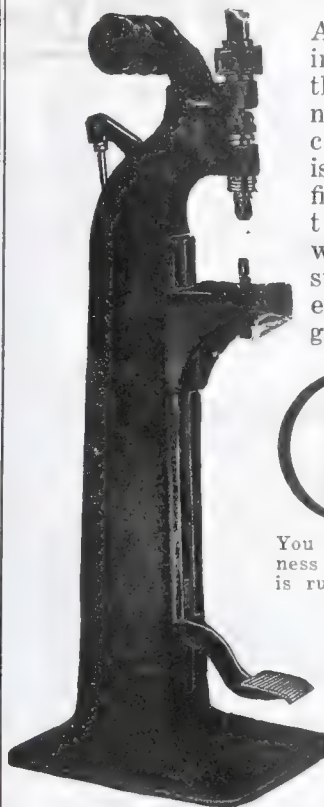
**Fitchburg, Mass. U. S. A.**

## **FITCHBURG**

**Plain Cylindrical  
Grinders**

*Built by*  
**Fitchburg Grinding Machine Co.**  
FITCHBURG, MASS., U.S.A.

## **No Skill Required**



Anybody with ordinary intelligence can operate this Rotary Rivet Spinning Machine. No special skill is required. It is a tool that perfectly fits labor conditions as they exist to-day. A woman can operate as successfully as the skilled mechanic who has gone to the front.

The  
**GRANT**  
is Noiseless

You are assured of perfect quietness wherever the Grant Rotary is running. And it spins a perfect polished rivet head every second without breaking or marring the casting. Rivets tight or loose. Write for details.

**GRANT**  
Mfg. & Machine Co.  
BRIDGEPORT, CONN., U.S.A.

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## **HACK SAW BLADES**

UNEQUALED IN QUALITY ANY SIZE OR LENGTH

Simonds Canada Saw Co. Limited  
ST. JOHN MONTREAL VANCOUVER

## **Advertise It!**

If you have Machinery which your plant has outgrown—advertise it. Or if you have a Factory Building which you have outgrown—advertise it. That is, advertise it in our Classified Advertising Section and **SELL** what you have for sale.

**CANADIAN MACHINERY**

CLASSIFIED ADVERTISING SECTION

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TORONTO, CANADA

# FORD-SMITH

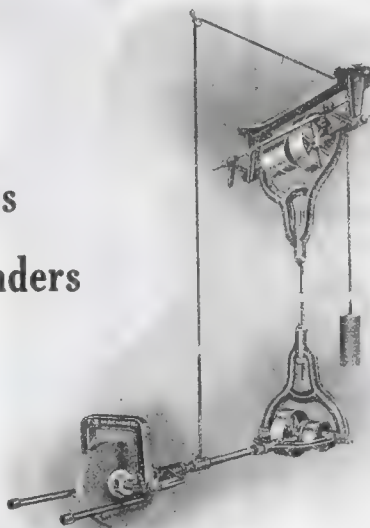
Disc Grinders

Wet Tool Grinders

Motor Driven Grinders

Heavy Type Floor Grinders

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*Our Catalogue on Grinding Machinery will interest you and will be sent on request.*

16" & 20"  
**SWING GRINDERS**

Plain and Universal  
**Milling Machines**

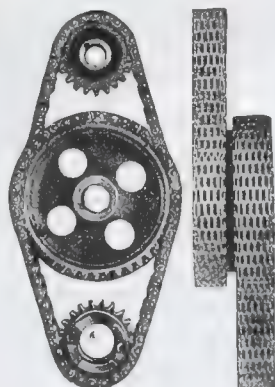
**Special Machinery**

Manufactured by  
**FORD-SMITH MACHINE CO.**  
LIMITED  
HAMILTON - CANADA

Foreign Agents:

W. E. Storey, 3 Arundel St.  
London, Eng.

Alf. Herbert, Ltd., 54 Dey St.  
New York.



**War Record  
Not Made  
Public**

**The "Whitney"  
Special Quality  
"Type M" Chains**

made a great showing  
during the war years  
1916-7 and 1918.

Our tests and demonstrations were made on prominent 8-cylinder motors in service on a large number of cars in the State of Connecticut.

During this long period not a single "Whitney" Chain or Sprocket had to be replaced and the condition of every Drive has been pronounced remarkable.

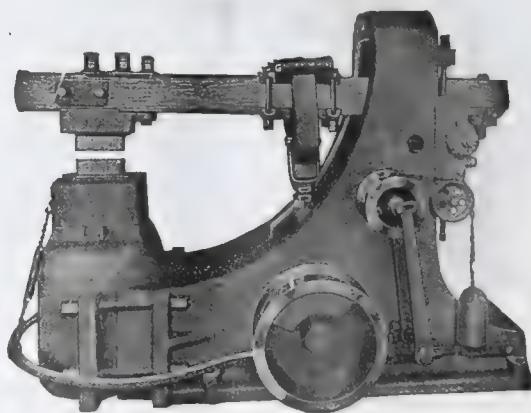
One Drive recently examined had given over 35,000 miles' service and both Chains and Sprockets were in such perfect condition that they appeared good for more than double that record (Sprockets having no adjustment).

The links of this SPECIAL CHAIN have finished faces and reamed holes, and the smooth faces do not damage the Sprocket teeth.

Our war contracts were such that we did not announce this SPECIAL CHAIN until after the conflict was over.

**THE WHITNEY MFG. CO.,**  
Hartford, Connecticut

**We'll Help You to Blaze  
a Trail of Efficiency**



**The Rochester Helve Hammer**

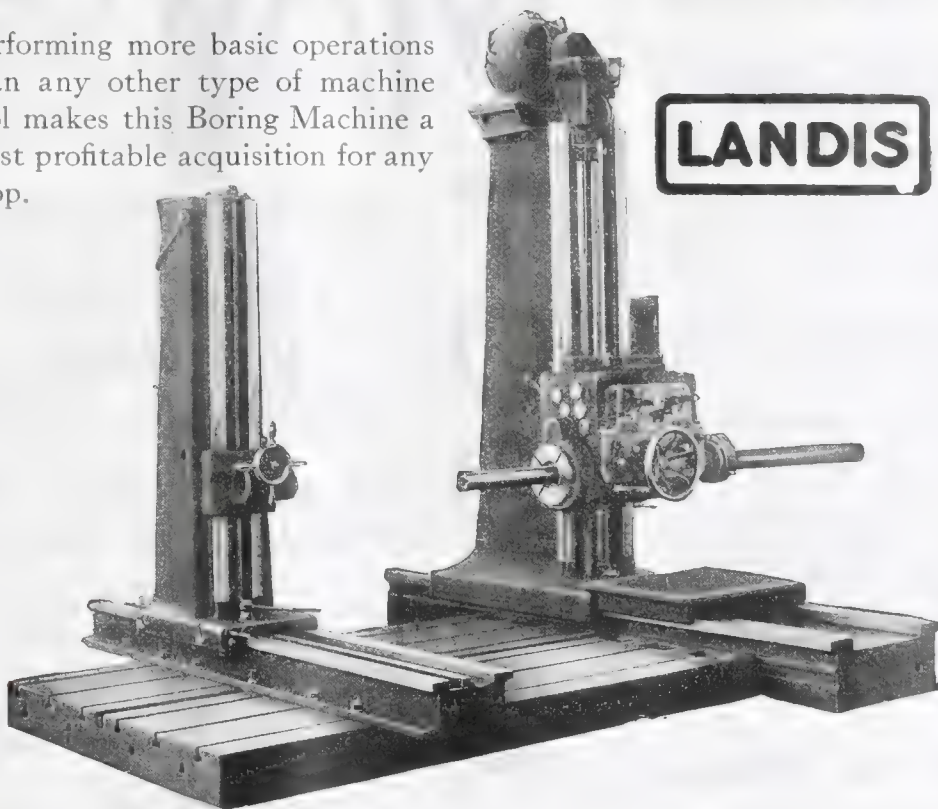
The Mechanic who works comfortably does the best work in quick time. He gives you WORTH-WHILE results. You can't pry him loose from a superior tool. He brags about it. Give the chap a chance who uses the Helve Hammer. In 9 cases out of 10 he'll say, "The Rochester Helve" for mine. He is the man who knows the 100% Satisfaction Helve. We can't tell you all its distinctive features in this brief advertisement, so we ask you to write for our Helve Hammer Book.

**THE WEST TIRE SETTER CO.**  
ROCHESTER, N.Y., U.S.A.



# A PROFITABLE MACHINE

Performing more basic operations than any other type of machine tool makes this Boring Machine a most profitable acquisition for any shop.



**LANDIS**

**Simple  
Durable  
Accurate**

**Continuous  
Operation**  
with little or no  
upkeep is the  
record of this  
machine.

Full details in  
catalog.

**LANDIS  
TOOL CO.**

WAYNESBORO, A

New York 50 Church St.



## "The Marshalltown Throatless Shears"

guarantees perfect work at less than half the ordinary expense.

Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to  $\frac{1}{2}$ " thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

Let us know your requirements.

**Marshalltown Mfg. Co.**

Marshalltown, Iowa

U. S. A.

## Six Post Readers in New Cabinet

**F**ORMER Finance Minister Cashen, who, following the crisis which led to the resignation of Premier Lloyd, of Newfoundland, has been called upon to form a Ministry, has already selected nine members to act with him.

Six of these, including the Premier himself, have been regular readers of THE FINANCIAL POST for some time.

This does not only indicate the quality as well as the extent of our circulation, but indicates also that men who carry big responsibilities find THE POST of value to them. It indicates, therefore, the approval which is meeting the effort of our editors and the great importance and value of the business information to which subscribers have access through the columns of THE FINANCIAL POST.

When the Government of Newfoundland was recently arranging the flotation of a \$5,000,000 bond issue THE POST'S opinion as regards some methods of marketing was quoted by members of the Cabinet.

### The Financial Post at Ottawa

**I**N the Dominion House of Commons the other week the attention of the Government was drawn to an article in THE FINANCIAL POST containing a reference to the financing of Roumanian orders through an agency established in London by Sir Clifford Sifton. Sir Thomas White mentioned that in reading his FINANCIAL POST that week, he had formed the opinion that the reference was to private marketing of bonds.

### Keen Business Men and Cabinet Ministers Read the Post

**S**IR THOMAS WHITE, with other Cabinet Ministers and prominent Canadian men of affairs, have found THE FINANCIAL POST of swift and sure business service. When you "get down to business" you want the plain facts—all of them—without frills—and quickly. You get them like that in THE POST. THE FINANCIAL POST will keep you informed on Canadian business matters in a way unrivalled by any other publication. Send for a subscription to-day. The price is \$3.00 per year, and you have only to fill in this form:

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Send me THE FINANCIAL POST every week till further ordered. I will pay subscription price, \$3.00 per year, on receipt of bill, or you may draw on me for this.

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—ACCURACY---RELIABILITY—  
OUR REGULAR PRODUCTS:  
**THREAD GAUGES**  
**SNAP GAUGES**  
**CYLINDRICAL GAUGES**

**WE ARE GENERAL AND  
SPECIAL TOOL MAKERS**

Let us quote you on your requirements, and have your tools made as you want them made.

**WOOD METAL PATTERNS**  
**PATTERNS Hand and Machine**

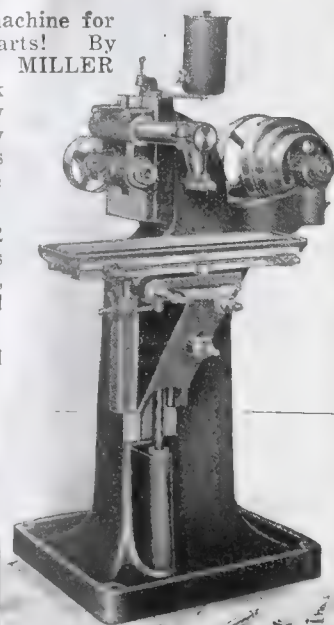
## U.S. MILLER

**Reduce Your Milling  
Costs  $\frac{1}{3}$  to  $\frac{1}{2}$**

Don't use a big machine for milling small parts! By adopting the U.S. MILLER you can do the work just as efficiently and at a greatly reduced cost — as much as  $\frac{1}{3}$  to  $\frac{1}{2}$  lower.

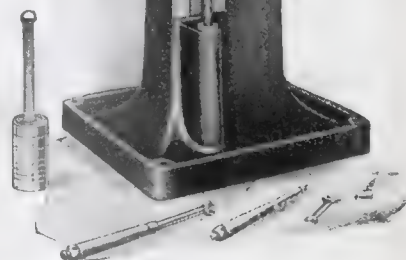
The U.S. MILLER stands alone in its class for capacity, accuracy and speed.

Write for the full details.



**United States  
Machine Tool Co.**

CINCINNATI  
Ohio U.S.A.





# The Secret of the Strikes

Most Canadians are asking "What is the cause of the 'Great Unrest' "? Is it the fault of labor—or of capital?—or is it the result of German propaganda? Do you know of the real reason for the labor disturbances in Canada, and elsewhere? Are YOU thoroughly familiar with the ins-and-outs of the plans which threaten a world-wide "tie-up"? This is something that should be understood by every Canadian. And every Canadian should read "The Secret of the Strikes," by Lieut.-Colonel J. B. Maclean in the August issue of MacLean's Magazine. It is brimful of startling and authoritative information regarding this great problem. Read it carefully. It starts on page 33, August MacLean's.

## "The Lecturer At Large"

Stephen Leacock is one of the continent's greatest humorists. "The Lecturer at Large" is one of the best humorous sketches that he has written. It is made up of what he terms "a few painful reminiscences of the platform" in the course of his lecturing up and down Canada. Get your family around you and read the sketch aloud—it's a rare treat.

## Other Big Features

"A Party in the Making." By J. K. Munro. Illustrated by William Casey. An article on the political situation, giving a great deal of inside information with reference to recent developments at Ottawa.

"Solving the Problem of the Arctic." By Vilhjalmur Stefansson. The fifth instalment of his story of the five years' explorations that he conducted for the Dominion of Canada.

"The Unspoiled Country." By Harold C. Lowrey. A descriptive article of a part of Canada which is little known to Canadians generally, Temagami.

"Petite Simunde." By Arthur Beverley Baxter. Illustrated by E. J. Dinsmore. A charming romance of the war. The author will be remembered favorably for his "Mr. Craighouse of New York, Satirist."

"The Seven Blue Doves." By W. A. Fraser. Illustrated by Charles L. Wrenn. The fifth of the Bulldog Carney series and in some respects the best. It is a mystery story.

"His Majesty's Well-Beloved." By Baroness Orczy. Illustrated by C. F. Peters. The second instalment of this splendid romantic novel of the colorful era of Charles II.

## The Month's Vital Question

Turn to page 34, August MACLEAN'S, and you will find timely and interesting information regarding the High Cost of Living—a problem of large proportions.

## The Review of Reviews

Here are a few of the articles chosen as the best published during the past month in all magazines:—Britain Winning Supremacy of the Air; Has Japan Two Governments?; Kaiser Employed Famous Beauties; The New Triple Alliance; Mammoth Animals in Alberta.

*Over 70,000 Canadian Families Buy*

# MACLEAN'S

"CANADA'S NATIONAL MAGAZINE"

**AUGUST ISSUE** *Now On Sale* **20c.**  
*At All News Dealers*

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**Hamilton                      Ontario**

### **Steel Products**

Open Hearth, Basic and Acid,  
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For Ships, Railways, Rolling  
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Soft Center and Solid Plow Steel,  
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## **Try it Yourself**

The best argument in favor of throwing away files the moment they become dull is to try filing a job yourself with a dull file.

If it makes you irritable, think what effect it must have on a man who has to file all day long.

Don't let your men work with dull files. Tell them to turn them in when they become dull.

When buying, specify Famous Five Files. You get a good run of sharp service from them because each file is accurately cut, well balanced and properly hardened.







## On Flange Work

The drilling of 15 Rear Axle Truck Housings is completed every hour. Each housing has 10 holes  $1\frac{3}{8}$  in. deep, which are drilled in one operation by the **NATCO**

The Maxwell Motor Company of Newcastle, Indiana, gives the information in this instance.

The machine is equipped with the **NATCO** patented feature—*independent change of speed for each spindle*—making it possible to drill, ream, tap, counterbore or spotface different size holes in one operation. Greater production, lowered costs and dependable accuracy are **NATCO** results whenever the work calls for operations on more than one hole.

**NATCO**s are built in 11 sizes ranging from 2 to 72 spindles.

We also design and build jigs and fixtures for use in connection with the **NATCO** Multi-Drillers.

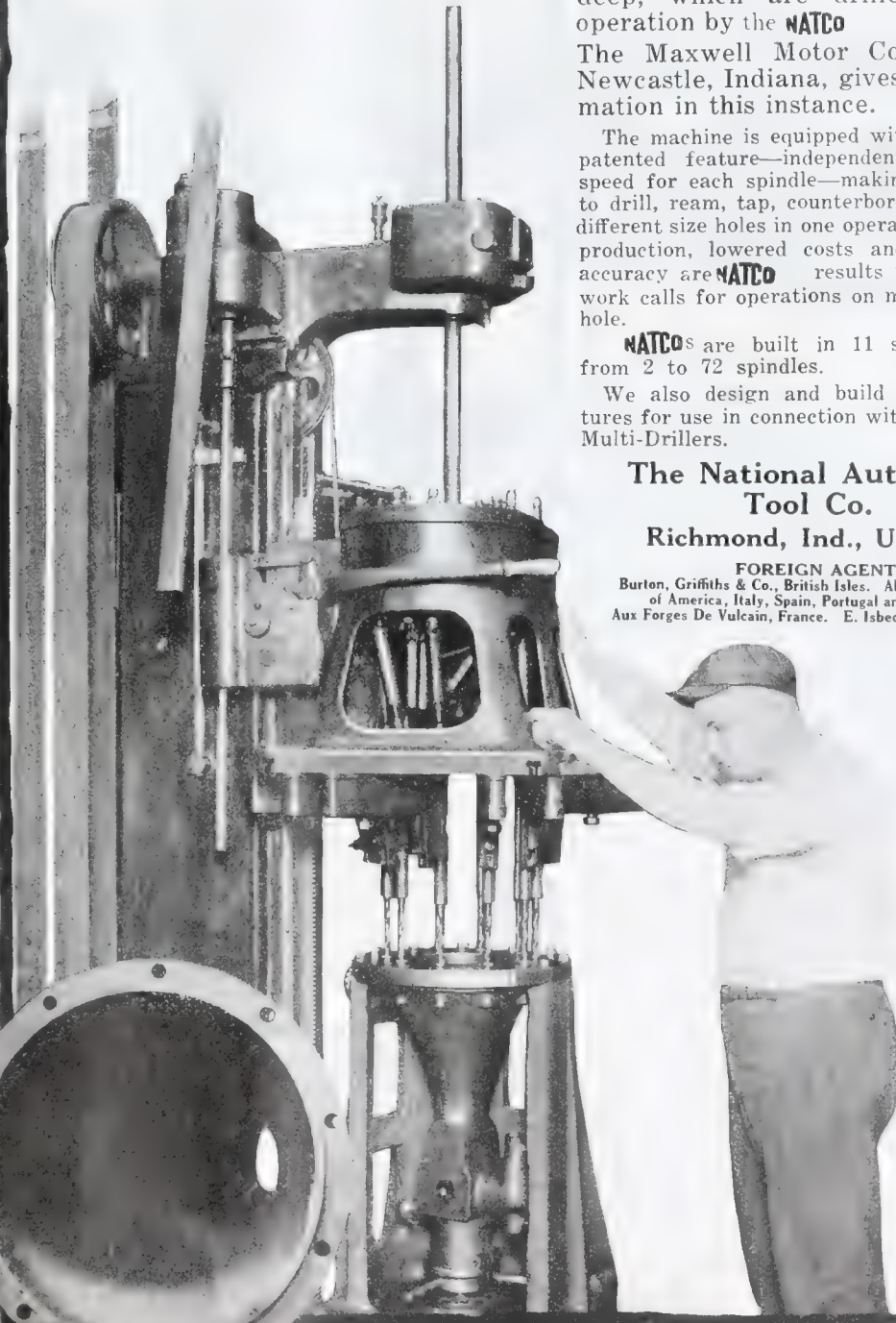
**The National Automatic Tool Co.**

Richmond, Ind., U. S. A.

**FOREIGN AGENTS:**

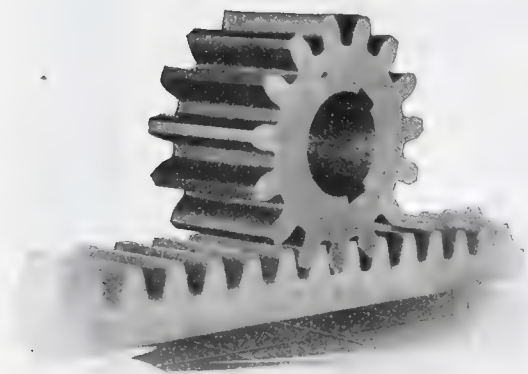
Burton, Griffiths & Co., British Isles. Allied Machinery Co. of America, Italy, Spain, Portugal and Switzerland. Aux Forges De Vulcain, France. E. Isbecque & Co., Belgium.

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Drill  
Speed  
For  
Every  
Need*





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*Wire  
for  
Quotation*

# Hamilton Gear CO. Ltd.

Van Horne Street

TORONTO

## The Canadian Disc Sander is 90% Dustless

Think what a godsend that it is to the pattern shop! Hundreds of prominent concerns are profiting immensely by using these sanders.

Two types of Canadian sanders are built—the Disc Sander and the Oscillating Spindle Sander.



Both machines are equipped with New Departure ball bearings

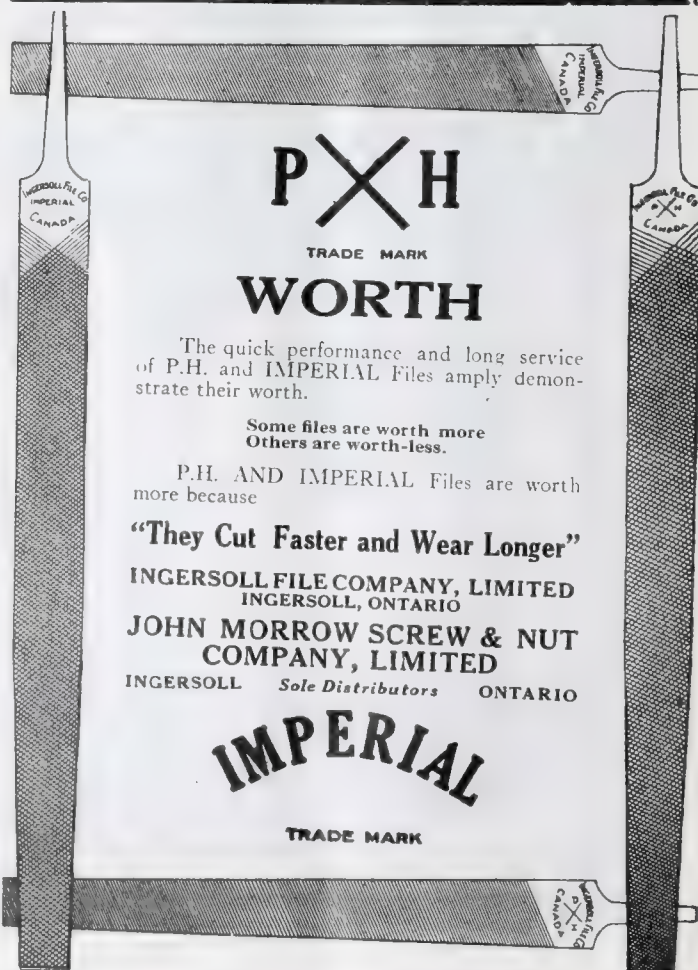
and General Electric motor. The table in each case can be tilted by a hand adjustment, 45 degrees down or 15 degrees up. Power is obtained by plugging into a lamp socket. Canadian Sanders are extraordinarily well built and are guaranteed against all defects.

Ask for Bulletin and Prices.

**Canadian Sander Mfg. Co.,**  
Incorporated

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## WORTH

The quick performance and long service of P.H. and IMPERIAL Files amply demonstrate their worth.

Some files are worth more  
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P.H. AND IMPERIAL Files are worth more because

**"They Cut Faster and Wear Longer"**

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## IMPERIAL

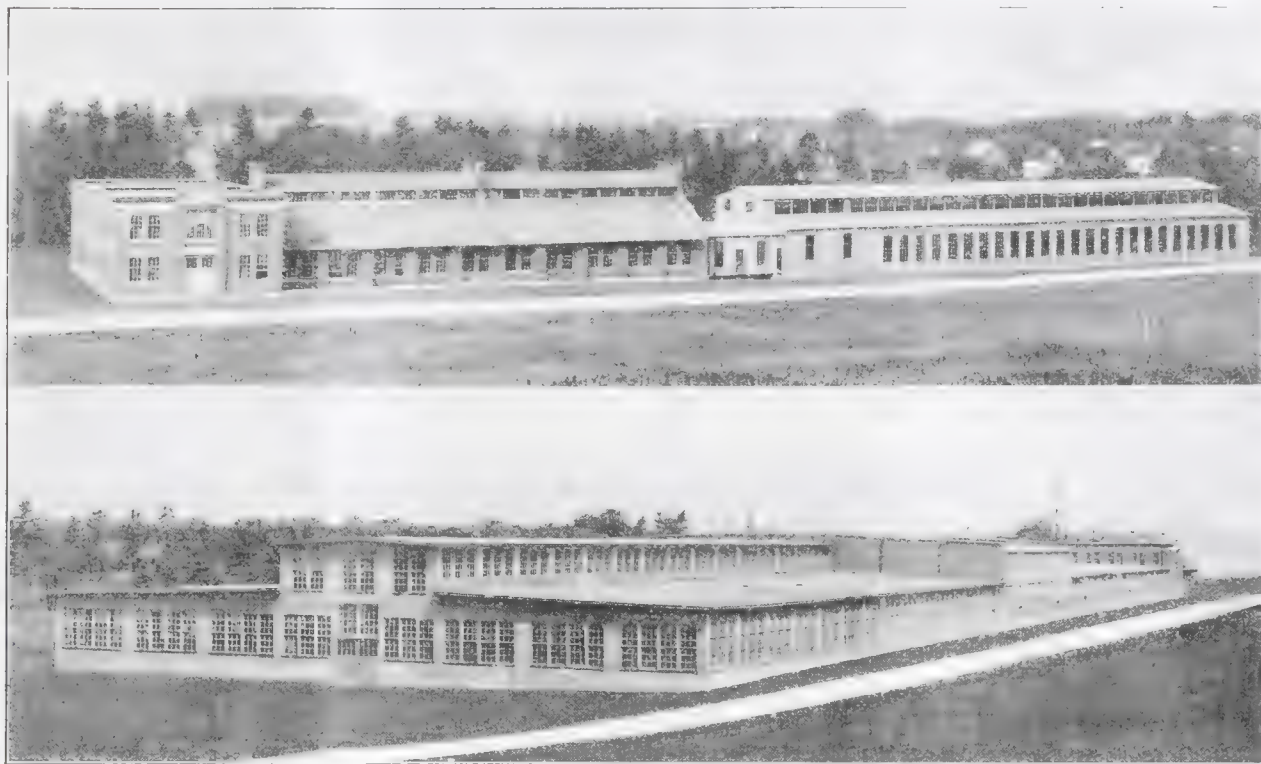
TRADE MARK



# PLANT FOR SALE

A large plant, idle since shell-making stopped, for sale at a very low price.

**Total floor space, 109,500 sq. ft.**



**PLANT OF PEMBROKE IRON WORKS LIMITED  
PEMBROKE, ONT.**

**Total area of property, nine acres.**

This large plant, consisting of three separate buildings, approximately 1,000 ft. long, with a width of from 50 to 140 ft., has a floor space of about 109,500 sq. ft., and with an area of nine acres gives ample room for storage or expansion. The large building at the bottom contains 85,000 sq. ft., built in 1918, frame construction; building in upper left, built in 1909 for a stove foundry, brick construction, has a cupola, contains 18,380 sq. ft.; building in upper right, frame construction, built in 1916, contains 5,520 sq. ft. These three buildings can be used separately, each for a different line of manufacture. Railway running across the property, and Muskrat River bordering it. Price of entire property, \$50,000.00.

The Town of Pembroke is situated at the junction of the Ottawa and Muskrat Rivers, and is favorably located between the East and West, being on the main line of three trans-continental railways.

Pembroke is a well-known lumbering centre, and has an abundance of raw material avail-

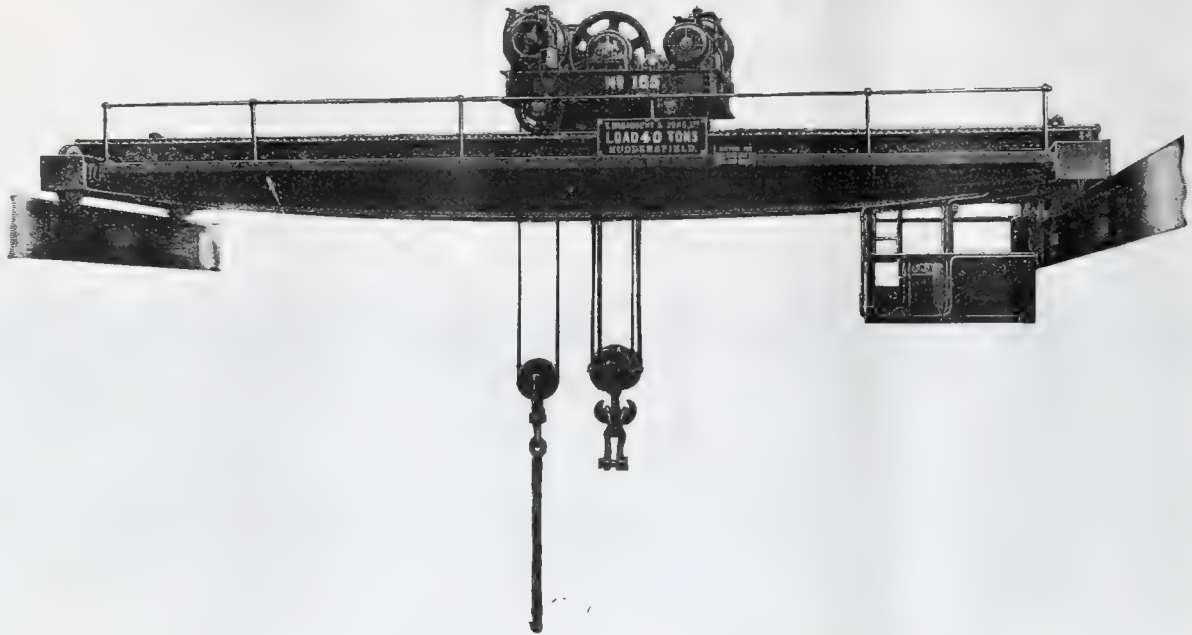
able for manufacturing purposes, such as pine, spruce, birch, maple, ash and poplar, which can be brought in by water and rail at a minimum of cost. Unlimited Hydro-Electric power obtainable at very low rates. There is a plenitude of labor available, both male and female. An unrivalled opportunity for an industry to start up with a small outlay.

**For further particulars and plan of buildings, apply to**

**PEMBROKE IRON WORKS LIMITED**

**PEMBROKE, ONTARIO**

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send your order to  
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1856

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The name of Gilbert & Barker stands to-day as the "symbol of service" in the heat treating field. G. & B. furnaces are designed right, built right and installed right.

There is a Gilbert & Barker furnace for every heat treating requirement. Our engineering department will give you expert advice without obligation.

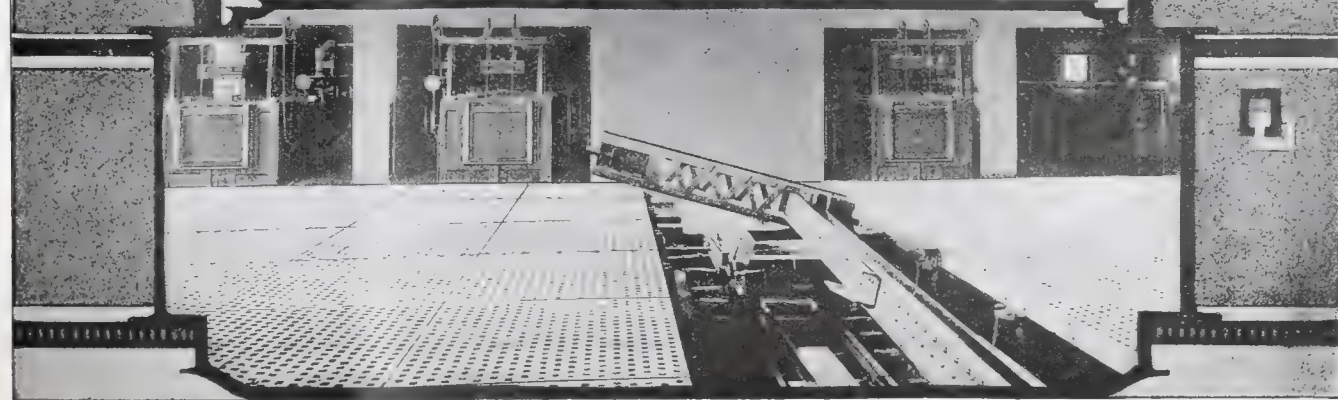
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ESTABLISHED 1865

SPRINGFIELD, MASS., U.S.A.

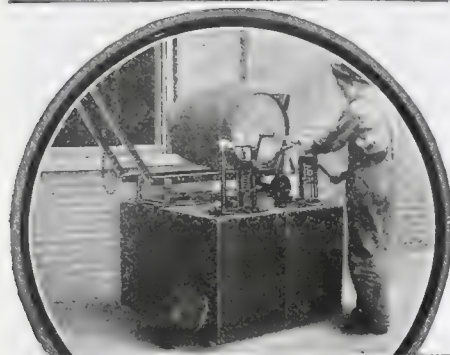
New York Office, 26 Broadway. Pittsburgh Office, 703 Lincoln Bldg.  
Philadelphia Office, 501 Manufacturers' Bldg. Detroit Office, 92 Broadway.







Tiresome, Expensive, Dangerous,  
Wasteful—but Unnecessary.



With Bowser Equipment One Man Does  
the Work with Less Time and Effort  
—and Without Loss.

## STOP WASTING LABOR IN HANDLING OILS

Do away with the back-breaking, disagreeable labor in storing and handling oils.

With Bowser Storage Equipment the heavy work is done mechanically—there is no wasted energy—all oils are easily and quickly put into storage by gravity.

## Save With **BOWSER** Systems

Distribution is done by accurate, rapid self-measuring pumps—no oils are left in shipping containers to dry up, leak and seep away—none is lost through spilling or dripping faucets. Every operation in the use of oils is done in a systematic, safe and saving manner.

*Write us for literature, showing why Bowser  
Systems are a paying investment*

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## Wherever Pipe is Cut or Threaded Economically

The probability is two to one that  
it's a

**Williams** Pipe Machine

that's on the job.

For in approximately two-thirds of all the larger plants in this country Williams' Pipe Machines are used.

It was the Williams Pipe Machine that brought highest honors home from the Panama Exposition. The Machine illustrated has a capacity of 21½" to 12". Also nine other sizes to meet your requirements.

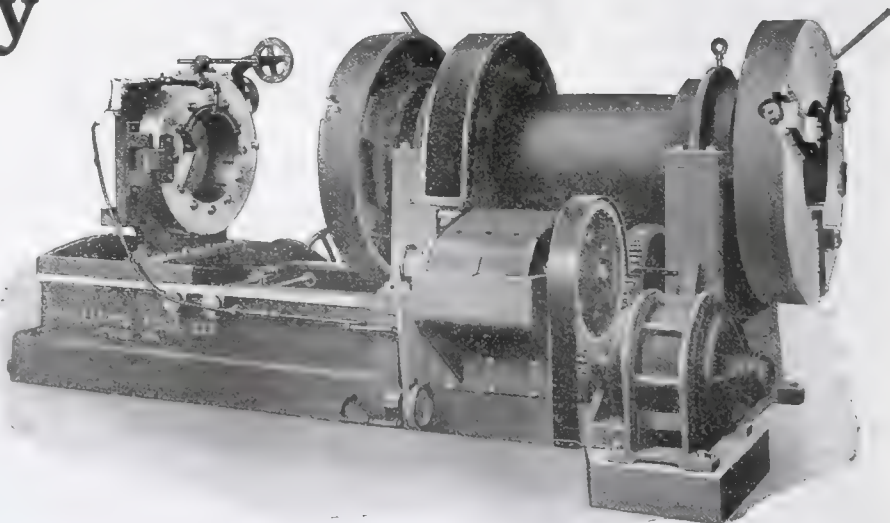
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**Williams Tool Company**

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The A. R. Williams Machinery  
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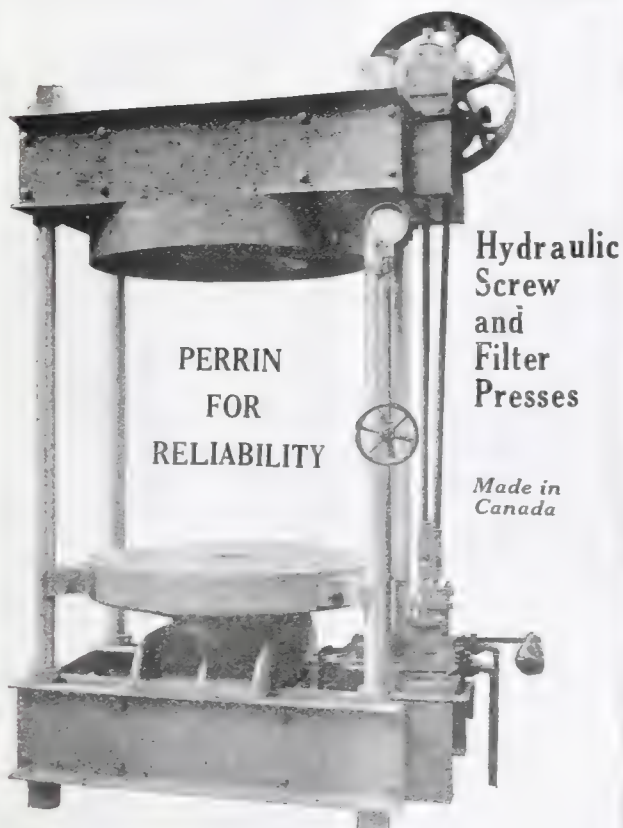
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**Mild Steel, High Carbon Steel, Manganese Steel, Chrome Steel**

We are manufacturers of Steel Castings running from  $\frac{1}{2}$  lb. to 5000 lbs. each and are in good position to furnish prompt deliveries at moderate prices. Try us with your next order.

**The William Kennedy & Sons, Limited, Owen Sound**

*ESTABLISHED 1860*



**Hydraulic  
Screw  
and  
Filter  
Presses**

*Made in  
Canada*

Hydraulic Truck Tire Press  
**WILLIAM PERRIN LIMITED**  
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Twist Drills, Taps, Hack Saw Blades, Milling Cutters,  
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Cold Rolled Mild Steel for Shafting, Etc.  
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For trimming, stamping, forging, punching, embossing.

Special presses are designed where the customer's requirements are unusual.

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## A WALL RADIAL DRILL

### That Puts Dollars in Your Pockets

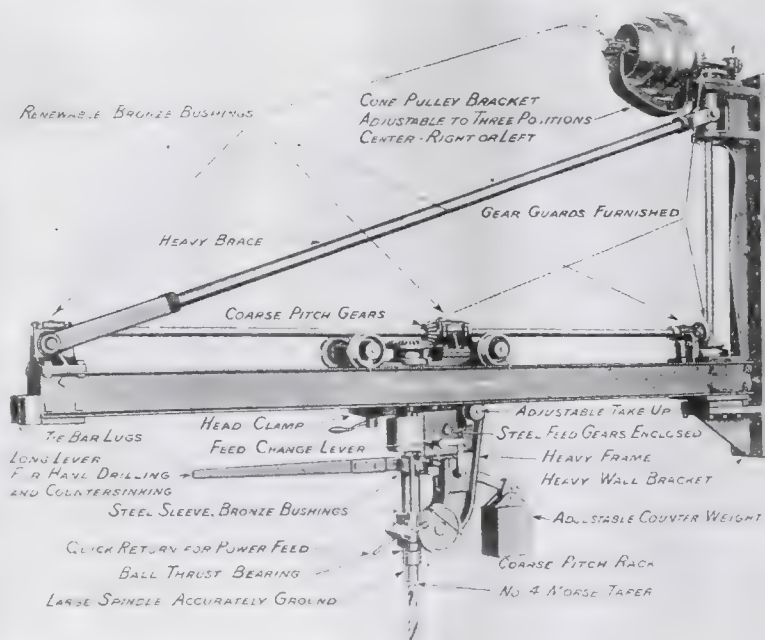
Here's a real machine tool in the wall radial drilling line for your consideration. Listen to this—the machine is made of high grade materials throughout, and the workmanship is beyond criticism. It is designed with the particular idea of maximum production, at a minimum operating expense. Entire control within easy reach makes the operators "boosters" for these machines. You can keep the dollars that may be slipping away on your wall radial drilling propositions, in your pocket by the installation of this machine.

Send for Detailed Bulletin

MADE IN FOUR STANDARD SIZES.

Rated size	Drills to centre of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



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419-425 Atlantic Avenue

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# WANT TO MAKE MONEY?

Well, then, **don't** buy second-hand lathes. **Don't** put your money in a pile of junk requiring constant repairs, with no accuracy or alignment.

# WANT TO SAVE WORRY?

Install in your shop **only new lathes** and **only Ciscos**. They are money-makers, time and worry-savers; they will keep the smile on your employees' faces and the green-backs in your wallet.

No lathe built is more powerful than a **Cisco Geared Head**.

No lathe is more simple in operation.

4 levers give 10 speeds. (20 with double friction countershaft). Accuracy .0005 in 18".

## For Immediate Delivery

14", any length, cone driven.

16", any length, cone or motor drive.

18", any length, cone, geared head, geared head motor drive.

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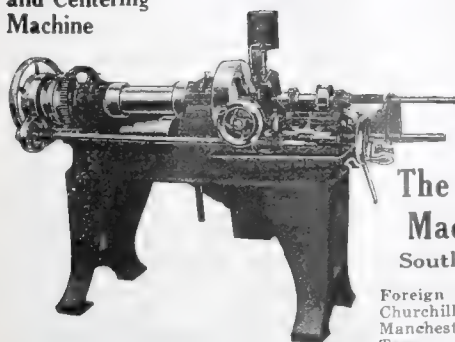
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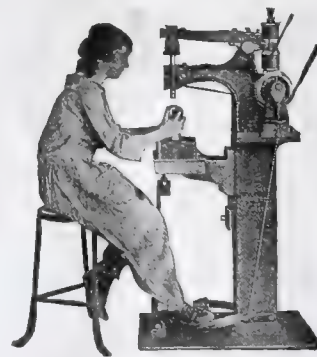


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Study the blue print and time study as given below.

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THREAD— $1\frac{1}{2}$  in. diameter, 2 1-16 length, 6 pitch  
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PIECE MILLED—Axle for tractor.  
MILLING FEED—4.35 per minute.  
MATERIAL—Machinery steel.



### Tractor Axle Operation TIME STUDY

5 minutes 37 seconds floor to floor milling both threads.  
Each thread milled in 65 seconds. Balance of time  
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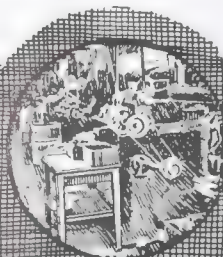
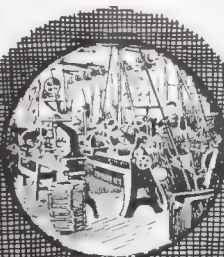
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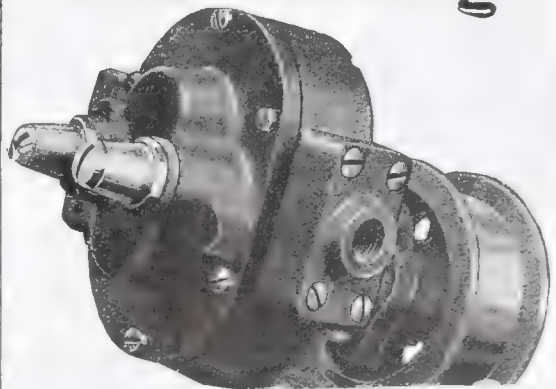
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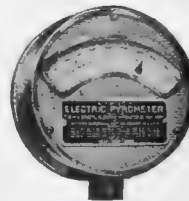
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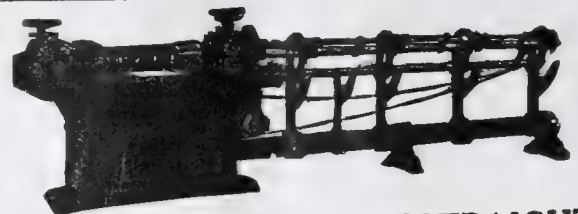
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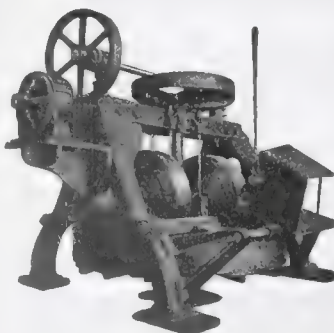
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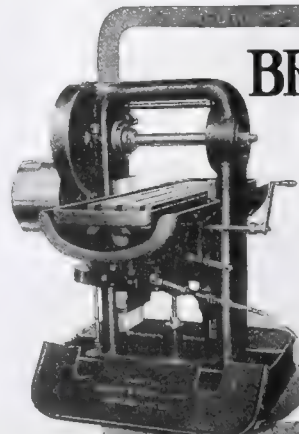


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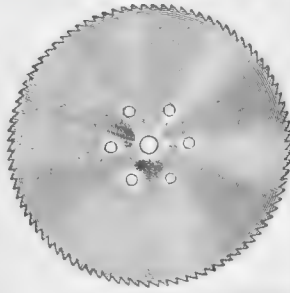
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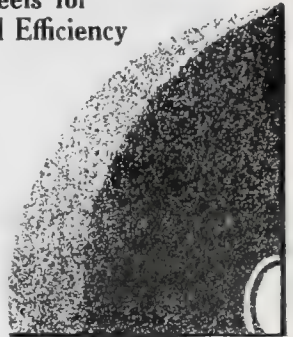


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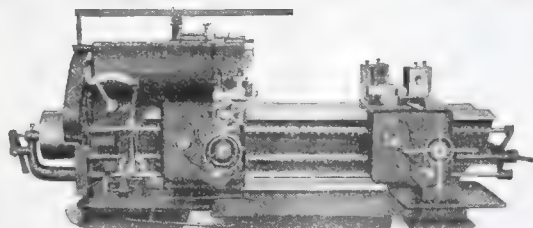
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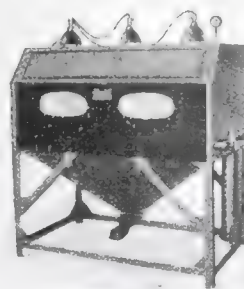
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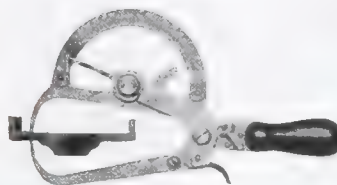
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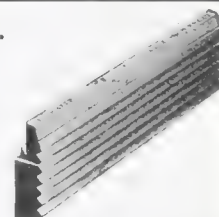
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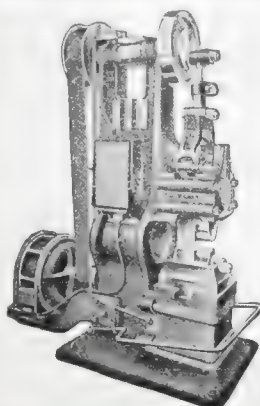


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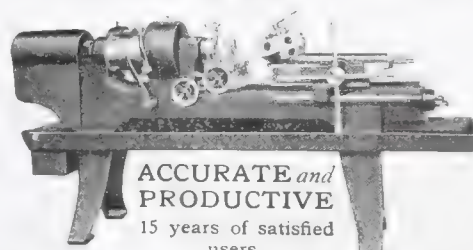
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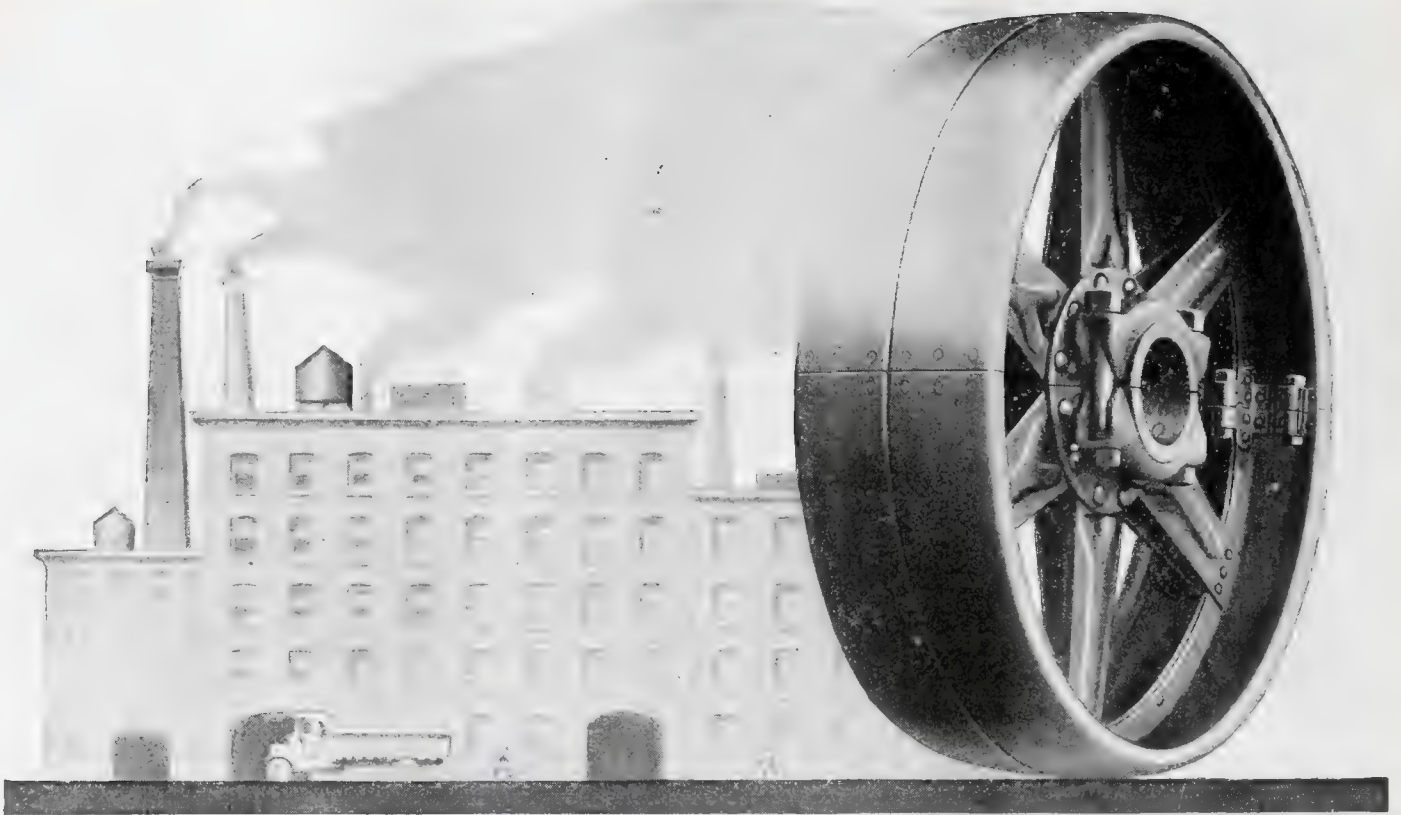
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Garlock-Walker Mach'y Co., Toronto.  
Gardner & Son, Robert, Montreal.  
National Acme Co., Cleveland, Windsor.  
Pratt & Whitney Co., Dundas, Ont.  
Roeblson Machine & Tool Co., Toronto.  
Williams Mach'y Co., A. R., Toronto.  
Williams & Wilson, Ltd., Montreal, Que.

## AUTOMATIC METAL CUTTING-OFF MACHINES

Greenfield Tap & Die Corp., Greenfield.

Wells Bros. of Can., Galt, Ont.  
Aikenhead Hardware Co., Toronto, Ont.  
Canadian Fairbanks-Morse Co., Montreal.  
Canada Metal Co., Toronto.  
G. F. Foss Mch'y. & Sply. Co., Montreal.

## AUTO SHEET METAL MACHINERY

Quickwork Co., St. Marys, Ohio.

## AUXILIARY HEADS

Hoefler Mfg. Co., Freeport, Ill.

## BABBITT METAL

Canada Metal Co., Ltd., Toronto, Ont.  
Eyst Metal Co., Ltd., Toronto.  
Magnolia Metal Co., Montreal.  
Rice Lewis & Son, Toronto, Ont.  
Tallman Brass & Metal Co., Hamilton.  
Wilkinson & Kompass, Hamilton, Ont.  
Williams & Wilson, Limited, Montreal.

## BAND SAWS

Oliver Mach'y. Co., Grand Rapids, Mich.

## BALL BEARINGS

Canadian Fairbanks-Morse Co., Montreal.  
Can. S. K. F. Co., Toronto, Ont.  
Chapman Double Ball Bearing Company, Toronto.  
The Gray Ball Bearing Co., Ltd., Toronto.  
Morrow Screw & Nut Co., John, Ingersoll.  
Rochester Ball Bearing Co., Rochester.  
Williams & Wilson, Ltd., Montreal, Que.

## BALLS, STEEL

Adams & Co., Ltd., Wm. Sheffield, Eng.  
Chapman Double Ball Bearing Co., Toronto.  
Baker & Co., Inc., Montreal, Que.  
Gray Ball Bearing Co., Ltd., Toronto.  
Rochester Ball Bearing Co., Rochester.  
Marshall, Son & Bunney, Toronto.  
Williams & Wilson, Limited, Montreal.

## BALLS, BURNISHING

Gray Ball Bearing Co., Ltd., Toronto.

## BAROMETERS

Taylor Instrument Co., Rochester, N.Y.

## BARRELS, SAND-BLAST

Pangborn Corp., Hagerstown, Md.

## BARRELS, STEEL SHOP

Grand Machine Co., Bridgeport, Conn.  
Cleveland Wire Spring Co., Cleveland.

## BARRELS, TUMBLING

Rand Machine Co., Bridgeport, Conn.  
Kate Foundry, Galt, Ont.  
Northern Crane Works, Walkerville, Ont.  
Wilson & Co., J. C., Belleville, Ont.  
Williams & Wilson, Ltd., Montreal, Que.

## BASE FACING MACHINES

Victoria Foundry Co., Ottawa, Ont.

## BARS, BORING

Gisholt Machine Co., Madison, Wis.  
Niles-Bement-Pond Co., New York.  
Wilson & Co., J. C., Belleville, Ont.  
Williams & Co., J. H., Brooklyn, N.Y.  
Williams & Wilson, Ltd., Montreal, Que.

## BARS, MERCHANT

Algoma Steel Corp., Sault Ste. Marie.

## BARS, CONCRETE REINFORCING

Algoma Steel Corp., Sault Ste. Marie.

## BEADING MACHINES

Quickwork Co., St. Marys, Ohio.

## BELT CONVEYORS

Can. Link-Belt Co., Toronto, Ont.  
Williams & Wilson, Limited, Montreal.

## BEARINGS, BRONZE

Wilson & Co., J. C., Belleville, Ont.

## BEARINGS, DIE CAST

Franklin Mfg. Co., Syracuse, N.Y.

## BELT-LACING MACHINES, HOOKS AND PINS

Clipper Belt Lacer Co., Grand Rapids.

## BELT LACING LEATHER

Aikenhead Hardware Co., Toronto, Ont.  
G. F. Foss Mch'y. & Sply. Co., Montreal.  
Grason & Knight Mfg., Worcester, Mass.  
Rice Lewis & Son, Toronto, Ont.

## BELT HOOKS, WIRE

Clipper Belt Lacer Co., Grand Rapids.

## BELTING, BALATA

Federal Engineering Co., Toronto, Ont.

## BELTING, RUBBER

Can. Consolidated Rubber Co., Montreal.

## BELTING, CHAIN

Can. Fairbanks-Morse Co., Montreal.  
Can. Link-Belt Co., Toronto, Ont.  
Jones & Glasco, Montreal, Que.  
Morse Chain Co., Ithaca, N.Y.  
Whitney Mfg. Co., Hartford, Conn.  
Williams & Wilson, Ltd., Montreal, Que.

## BELTING, CONVEYOR

Can. Consolidated Rubber Co., Montreal.  
Baxter & Co., Ltd., J. R., Montreal.  
Canadian Fairbanks-Morse Co., Montreal.  
Federal Engineering Co., Ltd., Toronto.  
Grason & Knight Mfg., Worcester, Mass.  
Jones & Glasco, Montreal, Que.  
McLaren Belting Co., J. C., Montreal.  
Morse Chain Co., Ithaca, N.Y.  
Plewes, Ltd., Winnipeg, Man.  
Rice, Lewis & Son, Toronto, Ont.  
Standard Mach'y. & Supplies, Montreal.  
Williams & Wilson, Ltd., Montreal, Que.

## BELTING, FRICTION AND SURFACE

Can. Con. Rubber Co., Ltd., Montreal.

## BELTING, LEATHER

Can. Graton & Knight Mfg. Co., Montreal.  
John Tullis & Son, Glasgow, Scotland.

## BELTING, WOVEN

Federal Engineering Co., Ltd., Toronto.

## BENDING ROLLS, PLUTE & AUGH

Wickes Bros., Saginaw, Mich.

## BENDING MACHINERY

Bertram, Ltd., Edinburgh, Scotland.  
Bertram & Sons Co., John, Dundas.  
Brown-Boggs Co., Ltd., Hamilton, Ont.  
Can. Blower & Forge Co., Kitchener.  
Garlock-Walker Mach. Co., Toronto.  
Williams & Wilson, Ltd., Montreal.

## BLASTING MACHINES, SAND

Garlock-Walker Machinery Co., Toronto.  
Jardine, A. B., & Co., Hespeler, Ont.  
National Mach. Co., Tiffin, Ohio.  
Niles-Bement-Pond Co., New York.  
Toledo Machine & Tool Co., Toledo.  
Williams & Wilson, Limited, Montreal.

## BILLET MARKERS

Matthews & Co., Jas. H., Pittsburgh, Pa.

## BILLETS

Atkins & Co., Ltd., Wm. Sheffield, Eng.  
Swedish Steel & Importing Co., Ltd., Montreal.  
Algoma Steel Corp., Sault Ste. Marie.  
Kaysor-Ellison & Co., Ltd., Montreal.  
Marshall, Son & Bunney, Toronto.  
Norton, Ralph B., Agent, Montreal.

## BILLETS, FORGING

General Steel Co., Milwaukee, Wis.  
Kaysor-Ellison & Co., Ltd., Montreal.  
Norton, Ralph B., Agent, Montreal.

## BINS, STEEL

Dennis Wire & Iron Works, London, Ont.  
Dominion Bridge Co., Montreal, Que.

MacKinnon Steel Co., Sherbrooke, Que.  
Toronto Iron Works, Ltd., Toronto, Ont.

## BLACKSMITH WORK

The Thos. Pink Co., Ltd., Pembroke.

## BLANKING

Hy. Hope & Sons of Can., Ltd., Peterboro.

## BLASTING MACHINES, SHOT AND STEEL GRIT

Pittsburgh Crushed Steel Co., Pittsburgh.

## BLOOMS AND SLABS

Algoma Steel Corp., Sault Ste. Marie.

## BLOWERS

Can. Blower & Forge Co., Kitchener, Ont.  
Garlock-Walker Machinery Co., Toronto.  
MacGovern & Co., Montreal, Que.  
Williams & Wilson, Limited, Montreal.

## BLOCK, CHAIN AND ROPE

Fellows Bros., Ltd., Chadley Heath, Eng.

## BLOCKS, CARGO

Fellows Bros., Ltd., Chadley Heath, Eng.

## BLOW PIPES AND REGULATORS

Carter Welding Co., Toronto, Ont.

Prest-O-Lite Co., Inc., Toronto, Ont.  
Welding & Supplies Co., Montreal, Que.

## BLUE PRINTING MACHINERY

Commercial Camera Co., Providence, R.I.  
Wickes Bros., Saginaw, Mich.

## BOARDS, GLASS CUTTING

Lufkin Rule Co., of Can., Windsor, Ont.

## BOARTZ

Joyce, Koebel & Co., Inc., New York.

## BOLT CUTTERS

Greenfield Tap & Die Corp., Greenfield, Mass.

## BOLT CUTTERS

Fellows Gear Shaper Co., Springfield, Vt.  
Greenfield Tap & Die Corp., Greenfield, Mass.

Wells Bros. of Can., Galt, Ont.  
Williams & Wilson, Ltd., Montreal, Que.

## BOOKS, TECHNICAL

MacLean Publishing Co., Toronto.

## BOILERS

Dominion Bridge Co., Montreal, Que.  
MacGovern & Co., Montreal, Que.  
MacKinnon Steel Co., Sherbrooke, Que.

## BOLT CUTTERS AND NUT TAPERS

Aikenhead Hardware Co., Toronto, Ont.  
Canadian Machinery Corp., Galt, Ont.  
Garlock-Walker Machinery Co., Toronto.  
Landis Machine Co., Waynesboro, Pa.  
A.B. Jardine & Co., Ltd., Hespeler, Ont.  
Rice, Lewis & Son, Toronto, Ont.  
Wells Bros. Co. of Canada, Galt, Ont.  
Williams & Wilson, Limited, Montreal.

## BOLTS

Aikenhead Hardware Co., Toronto, Ont.  
London Bolt & Hinge Wks., London, Ont.  
Morrow Screw & Nut Co., John, Ingersoll.  
Rice, Lewis & Son, Toronto, Ont.  
Steel Co., of Canada, Ltd., Hamilton.  
Wilkinson & Kompass, Hamilton, Ont.  
Williams & Co., J. H. Brooklyn, N.Y.

## BOLTS, COUPLING

Galt Machine Screw Co., Ltd., Galt, Ont.

## BOLTS, STAY

Morrow Screw & Nut Co., John, Ingersoll.

## BOLTS, SPRING SHAKLE

Can. Winkley Co., Ltd., Windsor, Ont.

## BOLTS, PATCH

Morrow Screw & Nut Co., John, Ingersoll.

## BOLT AND NUT MACHINERY

Bertram & Sons Co., John, Dundas, Ont.  
Canada Machinery Corp., Galt, Ont.  
Garlock-Walker Machinery Co., Toronto.  
Gardner & Son, Robert, Montreal.  
Landis Machine Co., Waynesboro, Pa.  
National Acme Co., Cleveland, Ohio.  
National Machinery Co., Tiffin, Ohio.  
Williams & Wilson, Ltd., Montreal, Que.  
Williams Machinery Co., A. R., Toronto.

## BOLT THREADING MACHINERY

Jardine & Co., Ltd., B., Hespeler.  
Landis Machine Co., Waynesboro, Pa.  
National Acme Co., Cleveland, Ohio.  
Victor Tool Co., Waynesboro, Pa.  
Williams & Wilson, Limited, Montreal.

## BORING MACHINES, PNEUMATIC CYLINDER

Cleveland Pneumatic Tool Co., Toronto.  
Canadian Fairbanks-Morse Co., Montreal.  
Can. Ingersoll-Rand Co., Sherbrooke, Que.  
Garlock-Walker Mach. Co., Toronto.

## BORING MACHINES, UPRIGHT AND HORIZONTAL

Bertram & Sons Co., John, Dundas.  
Bettis Machine Co., Rochester, N.Y.  
Canada Machinery Corp., Galt, Ont.  
Garlock-Walker Machinery Co., Toronto.  
Hoefer Mfg. Co., Freeport, Ill.  
Lamb Tool Co., Waynesboro, Pa.  
Niles-Bement-Pond Co., New York.  
Roeblson Machine & Tool Co., Toronto.  
Williams & Wilson, Ltd., Montreal, Que.

## BORING AND TURNING MILLS

Bertram & Sons Co., John, Dundas.  
Bettis Machine Co., Rochester, N.Y.  
Canada Machinery Corp., Galt, Ont.  
Gisholt Machine Co., Madison, Wis.  
Foss Mch'y & Sply Co., Geo. F., Montreal.  
Oliver Mach. Co., Grand Rapids, Mich.



Niles-Bement-Pond Co., New York  
Williams & Wilson Ltd., Montreal, Que.  
**BOXES, STEEL SHOP AND TOTE**  
Cleveland Wire Spring Co., Cleveland  
**BRAKEBAND LINING CUTTERS**  
Peck, Stow & Wilcox Co., Southington, Conn.

**BRAKES**

Brown, Rogers & Co., Hamilton, Can.  
Electric Steel & Metals, Ltd., Welland.  
**BRASS AND COPPER BARS, RODS**  
**BRAKES, CORNICES**  
Peck, Stow & Wilcox Co., Southington, Conn.

**BRASS FOUNDERS**

Canada Metal Co., Toronto.  
Greenleaf, Ltd., Belleville, Ont.  
St. Lawrence Welding Co., Montreal.  
Tallman Brass & Metal Co., Hamilton.  
Wilson & Co., J. C., Belleville, Ont.

**BRASS WORKING MACHINERY**

Foster Machine Co., Elkhart, Ind.  
Garlock-Walker Machinery Co., Toronto.  
Warner & Swasey Co., Cleveland, O.  
Niles-Bement-Pond Co., New York.  
Prest-O-Lite Co., Inc., Toronto, Ont.  
Wood Turret Machine Co., Brazil, Ind.  
Williams Machy. Co., A. R., Toronto.  
Williams & Wilson, Ltd., Montreal, Que.

**BRICKS, FIRE**

Harbison-Walker Refractories, Montreal.

**BRIDGES, RLY. AND HIGHWAY**

Dommon Bridge Co., Montreal, Que.  
MacKinnon Steel Co., Sherbrooke, Que.

**BRONZE RODS AND SHEETS, PLATES**

Brown's Copper & Brass Rolling Mills, New Toronto.

**BRONZE, NAVAL**

Brown's Copper & Brass Rolling Mills, New Toronto.  
Canada Metal Co., Toronto.  
Tallman Brass and Metal Co., Hamilton.

**BRONZE COPPER**

Canada Metal Co., Toronto.

**BUFFING AND POLISHING MACHINERY**

Ford-Smith Mach. Co., Hamilton.  
Foss Mch'y. & Sply Co., Geo. F. Montreal.  
Garlock-Walker Machinery Co., Toronto.  
Williams & Wilson, Limited, Montreal.

**BUCKETS, DUMP**

MacKinnon Steel Co., Sherbrooke, Que.  
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

**BUCKETS, ELEVATOR**

Can. Link-Belt Co., Toronto, Ont.  
MacKinnon Steel Co., Sherbrooke, Que.

**BUCKETS, CLAM SHELL, CRAB, DUMP**

Can. Link-Belt Co., Toronto, Ont.  
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.  
Northern Crane Works, Ltd., Walkerville.

**BULLDOZERS**

Bertram & Sons Co., John, Dundas.  
Canada Machinery Corp., Galt, Ont.  
Garlock-Walker Machinery Co., Toronto.  
Williams & Wilson, Limited, Montreal.

**BURNERS, OIL AND NATURAL GAS**

Northern Crane Works, Ltd., Walkerville.

**BURRS, IRON AND COPPER**

Parmenter & Bulloch Co., Gananoque.

**BUSHINGS, BRONZE**

Morrow Screw & Nut Co., John, Ingersoll.  
**CALIPERS**  
Pangborn Corporation, Hagerstown, Md.  
Peck Stow & Wilcox Co., Southington, Conn.

**CABINETS, SAND BLAST**

Pangborn Corporation, Hagerstown, Md.

**CABLE, ELECTRIC**

International Machinery & Supply Co., Ltd., Montreal, Que.

**CALKS, BOOT**

Jufkin Rule Co., of Can., Windsor, Ont.

**CANADA SILVER SHEETS, ROLLS**

Brown's Copper & Brass Rolling Mills, New Toronto.

**CANNERS' MACHINERY**

Biles, E. W. Co., Brooklyn, N.Y.  
Brown, Rogers & Co., Hamilton, Can.

**CANNERS' CONVEYORS**

Can. Link-Belt Co., Toronto, Ont.  
Wilson & Co., J. C., Belleville, Ont.

**CARBIDE**

Peck, Stow & Wilcox Co., Southington, Conn.

**CARBONIZING BOXES**

Can. Driver-Harris Co., Ltd., Walkerville.  
Katie Foundry, Galt, Ont.  
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.  
Swedish Crucible Steel Co., Windsor.

**CARRIERS, PNEUMATIC TUBE**

Jones & Glasco, Montreal.

**CARS, INDUSTRIAL**

Can. Blower & Forge Co., Kitchener, Ont.  
Can. Fairbanks-Morse Co., Ltd., Montreal.  
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

**CASTINGS, MACHINERY**

Wilson & Co., J. C., Belleville, Ont.

**CASTINGS, ALUMINUM, BRASS, BRONZE, COPPER, AND GUN METAL**

Algoma Steel Corp., Sault Ste. Marie, Brockville Foundry Co., Brockville, Ont.  
Franklin Mfg. Co., Syracuse, N.Y.  
Canada Metal Co., Ltd., Toronto, Ont.

**CASTINGS, DIE CAST**

Canada Metal Co., Ltd., Toronto, Ont.  
Franklin Mfg. Co., Syracuse, N.Y.

**CASTINGS, STEEL—ALL KINDS**

Electric Steel & Metals Co., Welland.  
Fellows Bros., Ltd., Chadley Heath, Eng.

**CARRIERS****COUPLING BOLTS**

John Morrow Screw & Nut Co., Ingersoll.  
Alexander Fleck, Ltd., Ottawa.  
Greenleaf, Ltd., Belleville, Ont.  
St. Lawrence Welding Co., Montreal.  
Tallman Brass & Metal Co., Hamilton.

**CASTINGS, BRASS AND IRON**

Algoma Steel Corp., Sault Ste. Marie.  
International Machinery and Supply Co., Ltd., Montreal, Que.

**CASTINGS, BUILDING**

Katie Foundry, Galt, Ont.

**CASTINGS, GRAY IRON**

Bernard Industrial Co., A., Fortierville, Q.  
Brown, Rogers & Co., Ltd., Hamilton.  
Alexander Fleck, Ltd., Ottawa.  
Gardner & Son, Robt., Montreal.  
Greenleaf, Ltd., Belleville, Ont.  
Hull Iron & Steel Foundries, Ltd., Hull.  
International Malleable Iron Co., Guelph.  
Kennedy & Sons, Ltd., Wm., Owen Sound.  
Katie Foundry, Ltd., Galt, Ont.  
Hamilton Co., Wm., Peterboro.  
Wilson & Co., J. C., Belleville, Ont.

**CASTINGS, PLUMBERS'**

Katie Foundry, Galt, Ont.

**CASTINGS, NICHROME**

Can. Driver-Harris Co., Ltd., Walkerville.

**CASTINGS, HARDWARE**

Katie Foundry, Galt, Ont.

**CASTINGS, STEEL CHROME AND MANGANESE STEEL**

Thos. Davidson Mfg. Co., Montreal, Que.  
Dom. Foundries & Steel, Hamilton, Ont.  
Hull Iron & Steel Foundries, Ltd., Hull.  
Kennedy & Sons, Ltd., Owen Sound.

**CASTINGS, MALLEABLE**

International Malleable Iron Co., Guelph.

**CASTINGS, NICKEL STEEL**

Hull Iron & Steel Foundries, Ltd., Hull.

**CEMENT MACHINERY**

Can. Fairbanks-Morse Co., Ltd., Montreal.  
Gardner, Robt., & Son, Montreal.

**CEMENT HANDLING MACHINERY**

Can. Link-Belt Co., Toronto, Ont.

**CENTERING MACHINES**

Victoria Foundry Co., Ottawa, Ont.

**CENTRE REAMERS**

Bertram & Sons Co., John, Dundas.  
Gardner, Robt., & Son, Montreal.  
Hulbert, Rogers Mch. Co., South Sudbury, Mass.

**Morrow Screw & Nut Co., J. Ingersoll, Ont.**

Niles-Bement-Pond Co., New York.  
Pratt & Whitney Co., Dundas, Ont.  
Wells Bros. Co., of Canada, Galt, Ont.  
Whitman & Barnes Mfg. Co., Akron, O.

**CHAIN, WELDED COIL**

Fellows Bros., Ltd., Chadley Heath, Eng.  
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

**CHAIN BLOCKS**

Aikenhead Hardware Co., Toronto, Ont.  
Can. Fairbanks-Morse Co., Ltd., Montreal.  
Ford Chain Block & Mfg. Co., Phila., Pa.  
Garlock-Walker Machy. Co., Toronto.  
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

Rice Lewis & Son, Toronto, Ont.  
Williams & Wilson, Ltd., Montreal, Que.  
Jones & Glasco, Montreal, Que.

**CHAINS, AGRICULTURAL**

Morse Chain Co., Ithaca, New York.

**CHAINS, AUTOMOBILE ENGINE**

Morse Chain Co., Ithaca, New York.

**CHAINS, BOOM, TIMBER**

Fellows Bros., Ltd., Chadley Heath, Eng.

**CHAINS, BICYCLE, DRIVE AND BLOCK**

Morse Chain Co., Ithaca, New York.

**CHAINS, FORGED**

Fellows Bros., Ltd., Chadley Heath, Eng.

**CHAINS, FOR ELEVATORS AND CONVEYORS**

Can. Link-Belt Co., Toronto, Ont.  
Morse Chain Co., Ithaca, N.Y.  
Williams & Wilson, Ltd., Montreal, Que.

**CHAIN, MALLEABLE, DETACHABLE AND RIVETED**

Can. Link-Belt Co., Toronto, Ont.  
Morse Chain Co., Ithaca, N.Y.  
Williams & Wilson Ltd., Montreal, Que.

**CHAINS, POWER TRANSMISSION**

Morse Chain Co., Ithaca, N.Y.

**CHAINS, SPROCKET WHEEL**

Morse Chain Co., Ithaca, N.Y.

**CHAIN DRIVES**

Can. Link-Belt Co., Toronto, Ont.  
Coventry Chain Co., Coventry, England.  
Jones & Glasco, Montreal, Que.  
Morse Chain Co., Ithaca, N.Y.

**CHASERS**

National Acme Co., Cleveland, Ohio.  
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.

**CHEMISTS**

Toronto Testing Lab'y, Ltd., Toronto.

**CHUCKS, AERO, AUTOMATIC**

Garvin Machine Co., New York.

**CHUCKS, COLLET, AIR**

Elliott & Whitehall Mach. & Tool Co., Galt, Ont.  
Smalley-General Co., Inc., Bay City, Mich.  
Williams & Wilson, Ltd., Montreal, Que.

**CHUCKS, DRILL, LATHE AND UNIVERSAL**

Aikenhead Hardware Co., Toronto, Ont.  
Almond Mfg. Co., Ashburnham, Mass.  
Bicknell-Thomas Co., Greenfield, Mass.  
Bertram & Sons Co., John, Dundas.  
Can. Blower & Forge Co., Kitchener, Ont.  
Can. Fairbanks-Morse Co., Ltd., Montreal.  
Cushman Chuck Co., Hartford, Conn.  
Foss Mch'y. & Sply Co., G. F., Montreal.  
Gardner, Robt., & Son, Montreal.  
Garlock-Walker Machy Co., Toronto.  
Gisholt Machine Co., Madison, Wis.  
Harding Bros., Chicago, Ill.  
Jacobs Mfg. Co., Hartford, Conn.  
Modern Tool Co., Erie, Pa.  
Rice Lewis & Son, Toronto, Ont.  
Skinner Chuck Co., New Britain, Conn.  
Whitton Machine Co., D. E., New London, Conn.  
Williams & Wilson, Ltd., Montreal, Que.

**CHUCKS, DRILL, AUTOMATIC AND KEYLESS**

Aikenhead Hardware Co., Toronto, Ont.  
Bicknell-Thomas Co., Greenfield, Mass.  
Can. Blower & Forge Co., Kitchener.  
Whitney Mfg. Co., Hartford, Conn.

**CHUCKS, FRICTION AND TAP**

Bicknell-Thomas Co., Greenfield, Mass.  
Victor Tool Co., Waynesboro, Pa.

**CHUCKS, MAGNETIC**

Heald Machine Co., Worcester, Mass.  
Williams & Wilson, Ltd., Montreal, Que.

**CHUCKS, RING WHEEL**

Ford-Smith Mach. Co., Hamilton, Ont.  
Gardner Machine Co., Beloit, Wis.

**CHUCKING MACHINES**

Garvin Machine Co., New York.  
Gisholt Machine Co., Madison, Wis.  
National Acme Co., Windsor, Vt.  
Niles-Bement-Pond Co., New York.  
Roelofson Machine & Tool Co., Toronto.  
Warner & Swasey Co., Cleveland, Ind.  
Wood Turret Mach. Co., Brazil, Ind.  
Williams & Wilson, Ltd., Montreal, Que.

**CIRCULATING SYSTEMS FOR LUBRICATING OIL**

Bowser & Co., Inc., Fort Wayne, Ind.  
Williams & Co., J. H., Brooklyn, N.Y.

**CLEANING COMPOUND**

Oakley Chemical Co., New York.

**CLOCK SPRINGS**

The Dunbar Brothers Co., Bristol, Conn.

**CLOCKS, WATCHMAN, PORTABLE**

Gisholt Machine Co., Madison, Wis.  
Harding Bros., Inc., Chicago, Ill.

**CLUTCHES, CHAIN**

Wright Mfg. Co., Lisbon, Ohio.

**CLUTCHES, FRICTION AND PULLEY**

Bernard Industrial Co., A., Fortierville, Q.  
Can. Link-Belt Co., Toronto, Ont.  
Carlyle Johnson Mach. Co., Manchester, Conn.  
Jones & Glasco, Montreal, Que.  
Positive Clutch & Pulley Wks., Toronto.  
Williams & Wilson, Ltd., Montreal, Que.

**COAL HANDLING MACHINERY**

Bond Engineering Works, Toronto, Ont.  
Can. Link-Belt Co., Toronto, Ont.  
Dominion Bridge Co., Montreal, Que.  
MacGovern & Co., Montreal, Que.  
MacKinnon Steel Co., Sherbrooke, Que.  
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.  
Northern Crane Works, Walkerville, Ont.  
Williams & Wilson, Limited, Montreal.

**COILING MACHINERY, WIRE AND SPRING**

Garlock-Walker Machinery Co., Toronto.  
Sleeper & Hartley, Inc., Worcester, Mass.

**COKE AND COAL**

Hanna & Co. M. A., Cleveland, O.

Nova Scotia Steel & Coal Co., New Glasgow, N.S.

**COLD ROLLED STRIP, ALL METAL COLLARS, SHAFTING**

Can. Driver-Harris Co., Ltd., Walkerville.  
Wilson & Co., J. C., Belleville, Ont.  
Williams & Co., J. H., Brooklyn, N.Y.  
Williams & Wilson, Ltd., Montreal, Que.

**COLLECTORS, PNEUMATIC**

Can. Blower & Forge Co., Kitchener.  
J. C. Wilson & Co., Belleville, Ont.

**COLLETS**

Becker Milling Machine Co., Boston.  
Harding Bros., Inc., Chicago, Ill.  
Wilson & Co., J. C. Belleville, Ont.

**COMPOSITION INGOT**

Brown's Copper & Brass Rolling Mills, New Toronto.  
Canada Metal Co., Toronto, Ont.

**COMBINED OPEN SIDE PLANNER-SHAPER**

Lynd-Farquhar Co., Boston, Mass.

**COMPRESSORS, AIR**

Can. Ingersoll Rand Co., Sherbrooke.  
Cleveland Pneumatic Tool Co., Toronto.  
Curtis Pneumatic Machy. Co., St. Louis.  
Garlock-Walker Machy. Co., Toronto.  
Hinchey Machine Co., Hinchey, Ill.  
MacGovern & Co., Montreal, Que.  
Williams & Wilson, Ltd., Montreal, Que.

**CONDENSERS**

MacGovern & Co., Montreal, Que.  
Smalley-General Co., Inc., Bay City, Mich.

**CONNECTING RODS**

Canada Foundry & Forgings, Ltd., Welland, Ont.

**CONTRACT WORK**

Banfield, W. H., & Sons, Toronto.  
Brown Engineering Corp., Toronto.  
Ford-Smith Machine Co., Hamilton, Ont.  
Homer & Wilson, Hamilton, Ont.  
Katie Foundry, Ltd., Galt, Ont.  
Marten Machine Co., Hamilton, Ont.  
St. Lawrence Welding Co., Montreal.  
Victoria Foundry Co., Ottawa.  
Wilson & Co., J. C., Belleville, Ont.  
Windsor Mach. Tool Co., Windsor, Ont.

**CONTROLLERS, MAGNETIC BRAKES, ELEC. WINCHES, MONO RAIL HOISTS**

Volta Mfg. Co., Welland, Ont.

**CONTROLLERS AND STARTERS**

Williams Machy Co., A. R., Toronto.

**CONTROLLING INSTRUMENTS**

Taylor Instrument Co., Rochester, N.Y.

**CONVERTERS, ROTARY**

MacGovern & Co., Montreal, Que.

**CONVEYORS, BELT AND CHAIN**

Can. Link-Belt Co., Toronto, Ont.  
Jones & Glasco, Montreal.

**COOLERS, WITH DRINKING FOUNTAINS**

Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

**COPING MACHINES**

Bertram & Sons Co., John, Dundas, Ont.  
Garlock-Walker Machinery Co., Toronto.  
Niles-Bement-Pond Co., New York.  
Can. Blower & Forge Co., Kitchener.

**COPPER, BUS BAR, SHEET, PATES, RODS**

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Morse Twist Drill & Mach. Co., New Bedford, Mass.  
Pratt & Whitney Co., Dundas, Ont.  
Rice Lewis & Son, Toronto, Ont.  
Whitman & Barnes Mfg. Co., Akron, O.

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Gray Ball Bearing Co., Ltd., Toronto.  
Baird Machine Co., Bridgeport, Conn.  
Ford-Smith Machine Co., Hamilton, Ont.  
Foster Machine Co., Elkhart, Ind.  
Williams & Wilson, Ltd., Montreal, Que.

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Bernard Industrial Co., The A., Fortierville, Que.  
Can. Link-Belt Co., Toronto, Ont.  
Williams & Wilson, Ltd., Montreal, Que.

**COUPLINGS, RAPID HOSE**

Int. Machinery & Supply Co., Ltd., Montreal, Que.

**COUPLINGS, PLAIN, FLEXIBLE AND CUT OFF**

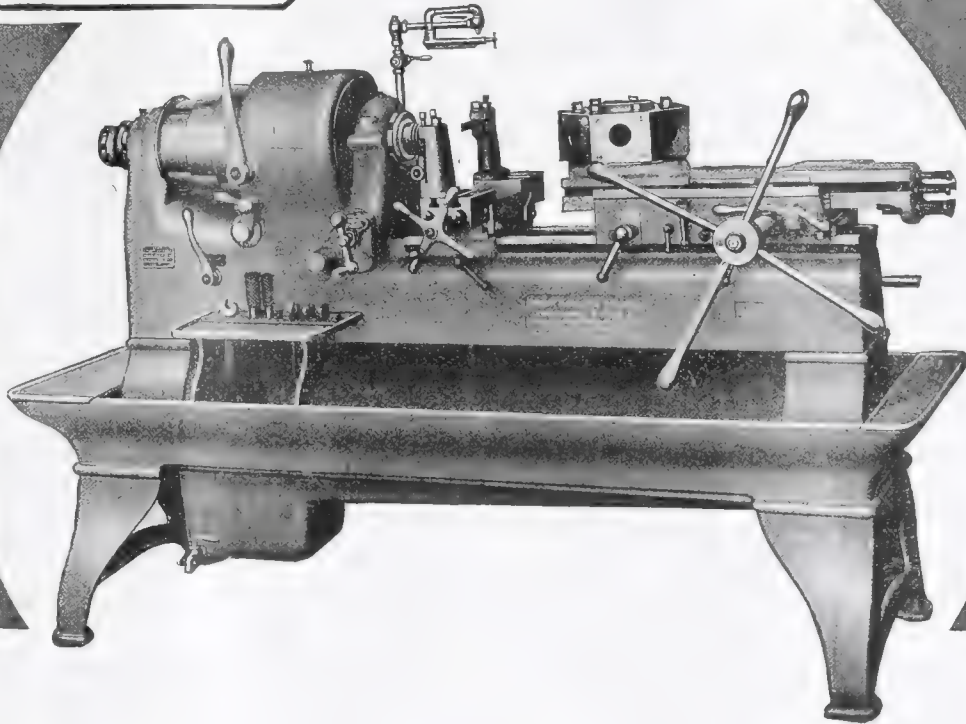
Cleveland Pneumatic Tool Co., of Canada, Toronto.  
Gardner, Robt., & Son, Montreal.  
Independent Pneumatic Tool Co., Chicago.  
Wilson & Co., J. C., Belleville, Ont.

**CRANES, LOCOMOTIVE**

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Niagara Falls, Ont.  
Northern Crane Works, Walkerville.**CRANE RUNWAYS**

MacKinnon Steel Co., Sherbrooke, Que.

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AND PORTABLE**Morris Crane and Hoist Co., Herbert,  
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Wilson & Co., J. C., Belleville.  
Williams & Wilson, Ltd., Montreal, Que.**CRANES, TRAVELLING, ELECTRIC  
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Dominion Bridge Co., Montreal.  
Hepburn, John T., Ltd., Toronto.  
MacKinnon Steel Co., Sherbrooke, Que.  
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Niles-Bement-Pond Co., New York.  
Northern Crane Works, Walkerville.**CRANES, TRAVELLING AND JIB**Fellows Bros., Ltd., Chadley Heath, Eng.  
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Morris Crane & Hoist Co., Herbert,  
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J. C. Wilson & Co., Belleville, Ont.  
Williams & Wilson, Ltd., Montreal, Que.**CRIMPS, LEATHER**Graton & Knight Mfg. Co., Worcester,  
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**CUPOLAS**Can. Blower & Forge Co., Kitchener.  
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See Bolt Outters.

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Oliver Machinery Co. Grand Rapids, Mich

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Cleveland Twist Drill Co., Cleveland.  
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Galt, Ont.Foss Mch. & Sply Co., G. F., Montreal.  
Garvin Machine Co., New York.  
Illinois Tool Works, Chicago, Ill.  
Morse Twist Drill & Machine Co., New  
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Pilot Steel & Tool Co., Montreal, Que.  
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Tabor Mfg. Co., Philadelphia, Pa.  
Whitney Mfg. Co., Hartford, Conn.**CUTTING-OFF MACHINES**Armstrong Bros., Tool Co., Chicago.  
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Butterfield & Co., Rock Island, Que.  
Brown, Roggs Co., Hamilton, Ont.  
Can. Fairbanks-Morse Co., Montreal.  
Foss Mch. & Sply Co., G. F., Montreal.  
Gardner, Robt. & Son, Montreal.  
A. B. Jardine & Co., Hespeler, Ont.  
Landis Machine Co., Waynesboro, Pa.  
Marshall, Son & Bunney, Toronto.  
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Morse Twist Drill & Mch. Co., New Bed-  
ford, Mass.  
National Acme Co., Cleveland, Ohio.  
Pilot Steel & Tool Co., Montreal, Que.  
Pratt & Whitney Co., Dundas, Ont.  
Rice Lewis & Son, Toronto, Ont.  
Ricker-Shafer Co., Erie, Pa.  
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Wells Brothers of Canada, Galt, Ont.  
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Garvin Machine Co., New York.  
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Landis Machine Co., Waynesboro, Pa.  
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Mass.  
Wells Bros. of Canada, Galt, Ont.**DIES, SELF-OPENING**Geometric Tool Co., New Haven.  
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Williams & Wilson, Ltd., Montreal, Que.**DIE FILING MACHINES**

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Garlock-Walker Machinery Co., Toronto.  
Garvin Machine Co., New York.  
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Norton, Ralph B., Agent, Montreal.  
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Montreal.**DRILLING MACHINES, GANG**Barnes, W. F. & John, Co., Rockford, Ill.  
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Canada Machinery Corp., Galt, Ont.  
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Garlock-Walker Mach. Co., Toronto.  
Garvin Machine Co., New York.  
Hoefler Mfg. Co., Freeport, Ill.  
Henry & Wright Mfg. Co., Hartford, Conn.  
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Can. Blower & Forge Co., Kitchener.  
Canada Mach. Corp., Galt, Ont.  
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Garlock-Walker Machinery Co., Toronto.  
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BIT STOCK**Aikenhead Hardware Co., Toronto, Ont.  
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Morse Twist Drill & Mch. Co., New  
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Independent Pneumatic Tool Co., Chicago.  
Niles-Bement-Pond Co., New York.  
Pilot Steel & Tool Co., Montreal, Que.  
Prest-O-Lite Co., Inc., Toronto, Ont.  
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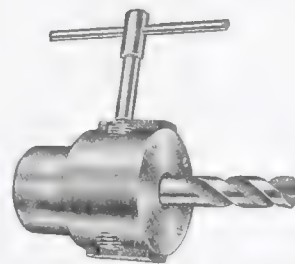
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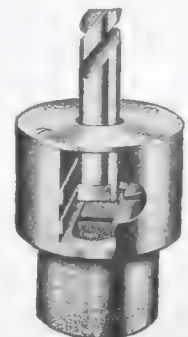
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Pratt & Whitney Co., Dundas, Ont.  
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Whitman & Barnes Mfg. Co., Akron, O.  
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Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

Williams & Wilson, Ltd., Montreal, Que.

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Ford-Smith Machine Co., Hamilton, Ont.

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The Foss Mch. & Supply Co., New York.

Garvin Machine Co., New York.  
Canadian Fairbanks-Morse Co., Montreal.

Canada Emery Wheels Co., Hamilton.  
Ford-Smith Mach. Co., Hamilton, Ont.

Rice Lewis & Son, Toronto, Ont.  
Standard Machy. & Supplies, Montreal.

Williamson & Compas, Hamilton, Ont.  
Williams & Wilson, Ltd., Montreal, Que.

**EMERY WHEEL DRSSINGS**

Wheel Truing Tool Co., Windsor, Ont.

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MacGovern & Co., Montreal, Que.

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A. R. Williams Machy. Co., Toronto.  
Williams & Wilson, Ltd., Montreal, Que.

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Can. Ingersoll-Rand Co., Sherbrooke, Que.

**ENGRAVERS**

Pritchard Andrews Co., Ottawa.

**ESCUTCHEON PINS**

Parmenter & Bulloch, Gananoque, Ont.

**EXHAUST HEADS AND HOODS**

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Canadian Fairbanks-Morse Co., Montreal.

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Pangborn Corporation, Hagerstown, Md.  
Williams & Wilson, Ltd., Montreal, Que.

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Walton Co., The, Hartford, Conn.

**EYE BOLTS AND NUTS**

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Strong, Kennard & Nutt Co., Cleveland.  
Willson & Co., Inc., T. A., Reading, Pa.

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Baird Machine Co., Bridgeport, Conn.  
Can. Blower & Forge Co., Kitchener, Ont.

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Williams & Wilson, Ltd., Montreal, Que.

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Page Steel & Wire Co., Adrian, Mich.

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Vanadium-Alloys Steel Co., Pittsburgh, Pa.

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Adkins & Co., Wm., Sheffield, Eng.

Ingersoll File Co., Ltd., Ingersoll, Ont.  
Morrow Screw & Nut Co., J. Ingersoll, Ont.

Marshall, Son & Bunney, Toronto, Ont.  
Nicholson File Co., Port Hope, Ont.

Rice Lewis & Son, Toronto, Ont.  
Standard Machy. & Supplies, Montreal.

Simonds Mfg. Co., Pittsburg, Mass.  
Whitman & Barnes Mfg. Co., Akron, O.

Wilkinson & Compass, Hamilton, Ont.

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Strong, Kennard & Nutt Co., Cleveland.

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Harbison-Walker Refractories Co., of Canada, Montreal, Que.

**FIRE EXTINGUISHERS**

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Crescent Machine Co., Ltd., Montreal.

Elliott & Whitehall Mach. & Tool Co., Galt, Ont.  
Illinois Tool Works, Chicago, Ill.

Marten Machine Co., Hamilton, Ontario.  
Toronto Tool Co., Toronto, Ont.

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**FLANGING CLAMPS**

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A. B. Jardine & Co., Ltd., Hespeler, Ont.  
Rice Lewis & Son, Toronto, Ont.

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Nova Scotia Steel & Coal Co., New Glasgow, N.S.

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Dominion Bridge Co., Montreal, Que.

Dom. Forge & Stamp'g Co., Walkerville.  
Steel Co. of Canada, Ltd., St. Catharines.

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Riss, E. W. Co., Brooklyn, N.Y.

Brown, Boggs Co., Ltd., Hamilton, Ont.  
Canada Machinery Corp., Galt, Ont.

Garlock-Walker Machy. Co., Toronto, Ont.  
National Machy. Co., Tiffin, Ohio.

Williams & Wilson, Ltd., Montreal, Que.

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Can. Found. & Forgings, Ltd., Welland.

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Mechanical Eng'g Co., Three Rivers, Q.

Standard Fuel Engr. Co., Detroit, Mich.  
Williams & Wilson, Ltd., Montreal, Que.

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Toronto Iron Works, Ltd., Toronto.

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Standard Fuel Engr. Co., Detroit, Mich.

**FURNACES, LEAD AND SALT**

Standard Fuel Engr. Co., Detroit, Mich.

**FURNACES, RIVETING**

Standard Fuel Engr. Co., Detroit, Mich.

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**GASOLINE TANKS**

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**GASOLINE PUMPS, SELF-MEASURING**

Bowser & Co., S. F., Inc., Fort Wayne.

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**GAUGERS, CALIPERS**

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**GAUGES, HYDRAULIC**

Taylor Instrument Co., Rochester, N.Y.

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Wells Bros. of Can., Galt, Ont.

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Canadian Fairbanks-Morse Co., Montreal.

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Garvin Machine Co., New York.

Illinois Tool Works, Chicago, Ill.  
C. E. Johanson, Inc., Toronto, Ont.

Morse Twist Drill & Machine Co., New Bedford.  
Peck, Stow & Wilcox Co., Southington, Conn.

Pratt & Whitney Co., Hartford, Conn.  
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Toronto Tool Works, Toronto, Ont.  
Wells Brothers Co. of Canada, Galt, Ont.

West. Engines Inc., Toronto, Ont.

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Norton, Ralph B., Agent, Montreal.

Wilson & Co., J. C., Belleville, Ont.  
Williams & Co., J. H., Brooklyn, N.Y.

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Fellows Gear & Shaper Co., Springfield, V.

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Fellows Gear & Shaper Co., Springfield, V.

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D. E. Whitton Machine Co., New London, Conn.

A. R. Williams Machy. Co., Toronto.  
Williams & Wilson, Ltd., Montreal, Que.

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Gisholt Machine Co., Madison, Wis.

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Bridgeford Mach. Tool Wks., Rochester.

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**GEARS, COMPENSATING**

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Dom. Foundries & Steel, Hamilton, Ont.

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Grant Gear Works, Boston, Mass.

Hamilton Gear & Machine Co., Toronto.  
Hull Iron & Steel Found., Ltd., Hull, Q.

Illinois Tool Works, Chicago, Ill.  
Jones & Glasco, Montreal.

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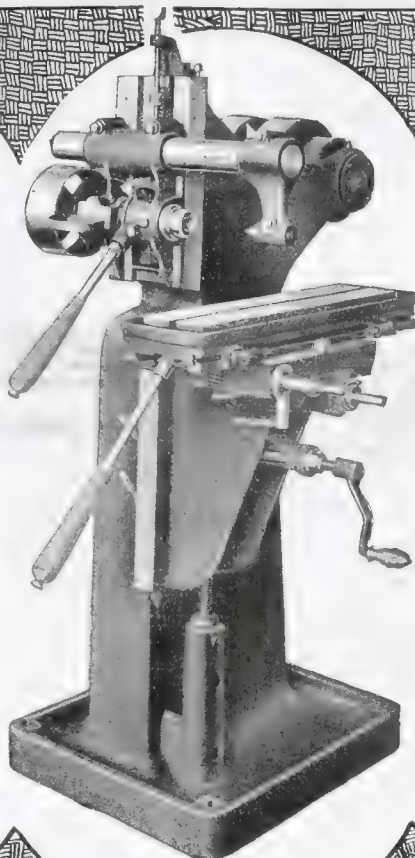
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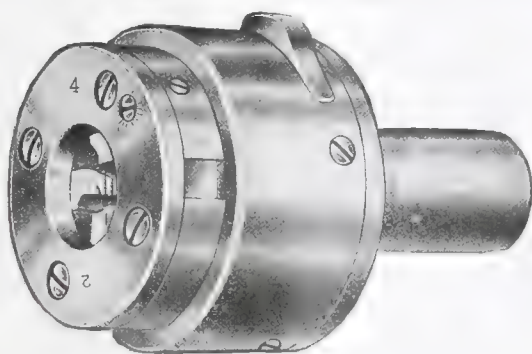
The lever controls make a very convenient method of operation, though crank is furnished for use when so desired.

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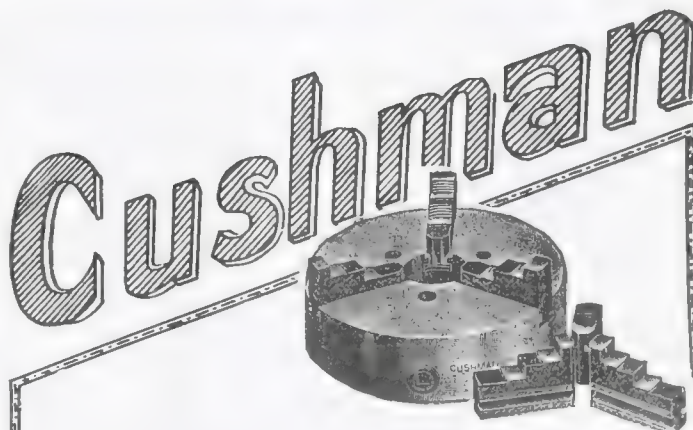
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Norton Grinding Co., Worcester, Mass.  
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Greenfield Machine Co., Greenfield, Mass.  
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United States Elec. Tool Co., Cincinnati.  
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Greenfield Machine Co., Greenfield, Mass.  
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Peerless Machine Co., Racine, Wis.  
Racine Tool & Machine Co., Racine, Wis.  
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Wells Bros. of Canada, Galt, Ont.

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Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.  
Northern Crane Works, Walkerville, Ont.  
Wright Mfg. Co., Lisbon, Ohio.  
Williams & Wilson, Limited, Montreal.

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Dominion Bridge Co., Montreal, Que.  
Electric Steels & Metals Ltd., Welland.  
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Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.  
Northern Crane Works, Walkerville, Ont.  
Williams & Wilson, Limited, Montreal.

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Independent Pneumatic Tool Co., Chicago.  
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Victoria Foundry Co., Ottawa.  
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Brown & Sharpe Mfg. Co., Providence.  
Starrett Co., L. S., Athol, Mass.

**INDEX CENTRES**  
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Garvin Machine Co., New York.  
Williams & Wilson, Limited, Montreal.

**INDICATING INSTRUMENTS**  
Taylor Instrument Co., Rochester, N.Y.

**INGOT METAL**  
Brown's Copper & Brass Rolling Mills.  
New Toronto, Ont.

**INGOTS, STEEL**  
Nova Scotia Stl. & Coal Co., New Glasgow.

**INGOTS, FORGING AND ROLLING**  
Electric Steel & Metals Co., Welland.

**INSTRUMENTS, ENGINEERING**  
Consolidated Optical Co., Toronto.

**IRON ORE**  
Hanna & Co., M. A., Cleveland, O.

**IRON SAND**  
Pittsburgh Crushed Steel Co., Pittsburgh.

**IRON, WROUGHT, ROLLED, PIG**  
Swedish Steel & Imp. Co., Ltd., Montreal.

**JACKS**  
Aikenhead Hardware Co., Toronto, Ont.  
Can. Fairbanks-Morse Co., Montreal.

Fellows Bros., Ltd., Chadley Heath, Eng.  
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.  
Northern Crane Works, Walkerville, Norton, A. O., Coaticook, Que.  
Rice Lewis & Son, Toronto, Ont.  
Williams & Wilson, Limited, Montreal.

**JACKS, SCREW AND HYDRAULIC**  
Fellows Bros., Ltd., Chadley Heath, Eng.

**JACKS, PIT AND TRACK**  
Canadian Fairbanks-Morse Co., Montreal.  
Northern Crane Works, Walkerville.

**JAWS, FACE PLATE**  
Cushman Chuck Co., Hartford, Conn.  
Skinner Chuck Co., New Britain, Conn.

**JOINTERS**  
Gray Ball Bearing Co., Ltd., Toronto.

**JIGS, TOOLS, ETC.**  
Brown Engineering Corp., Toronto.  
Elliott & Whitehall Mach. & Tool Co., Galt.  
Gisholt Machine Co., Madison, Wis.  
Homer & Wilson, Hamilton, Ont.  
Illinois Tool Works, Chicago, Ill.  
Marten Machine Co., Hamilton, Ont.  
Toronto Tool Co., Toronto, Ont.

**JOURNAL WEDGES**  
Canada Foundries & Forgings, Welland.

**KEY SEATERS**  
Garlock-Walker Machy. Co., Toronto, Ont.  
Garvin Machine Co., New York.  
Morton Mfg. Co., Muskegon Heights, M. A. R. Williams Machy. Co., Toronto.  
Williams & Wilson, Ltd., Montreal.

**KEYS, MACHINE**  
Whitney Mfg. Co., Hartford, Conn.  
Williams & Co., J. H., Brooklyn, N.Y.

**KILNS**  
Can. Blower & Forge Co., Kitchener, Ont.  
Kennedy & Sons, Wm., Owen Sound, Ont.  
MacKinnon Steel Co., Sherbrooke, Que.

**KNIFE GRINDERS**  
Gray Ball Bearing Co., Ltd., Toronto.

**LABELS AND TAGS**  
Matthews & Co., Jas. H., Pittsburgh, Pa.

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Northern Crane Works, Walkerville.

**LACING MACHINES**  
Clipper Belt Lacer Co., Grand Rapids, M.

**LAMPS, ARC, INCANDESCENT**  
Can. General Electric Co., Toronto, Ont.

**LAMPS, TUNGSTEN AND NITRO**  
Can. General Electric Co., Toronto, Ont.

**LAG SCREW GIMLET POINTERS**  
National Machy. Co., Tiffin, Ohio.

**LATHES, CHUCKING**  
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Wood Turret Machine Co., Brazil, Ind.  
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Williams & Co., J. H., Brooklyn, N.Y.

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**LATHES, BORING**  
Bridgeford Mach. Tool Works, Rochester.  
Lojce & Shipley, Cincinnati, O.  
Williams & Wilson, Ltd., Montreal, Que.

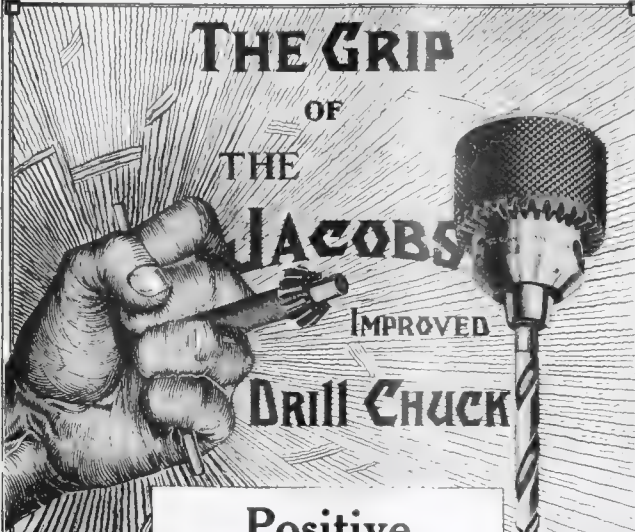
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Williams & Wilson, Ltd., Montreal, Que.

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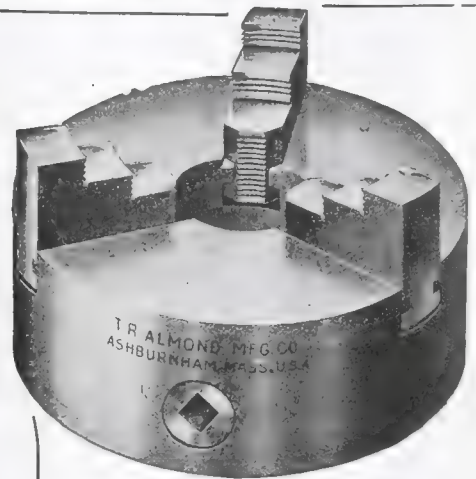
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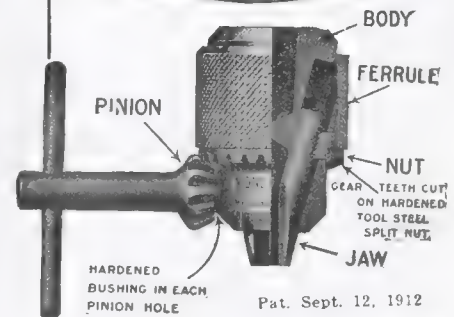
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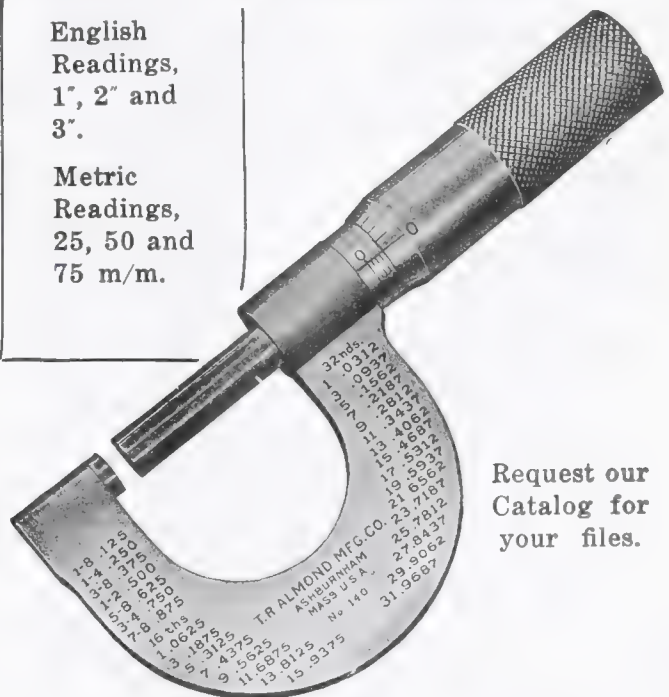
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**W**HEN a tap breaks off close or below the surface, you'll find the Walton Tap Extractor will save a great deal of time and trouble. The crucible fingers grasp the flutes of the tap, a twist of the wrench and the piece is out. Don't you think it would pay to have a few lying around on your benches?

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Walcott Lath Co., Jackson, Mich.  
Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.  
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Foss Machy. & Sply Co., G. F., Montreal.  
Garlock-Walker Machy. Co., Toronto, Ont.  
Harding Bros., Inc., Chicago, Ill.  
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Niles-Bement-Pond Co., New York.  
Seneca Falls Mfg. Co., Seneca Falls, N.Y.  
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Worcester Lath Co., Worcester, Mass.  
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Graton & Knight Mfg. Co., Worcester, M.

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Foss Machy. & Sply Co., G. F., Montreal.  
Standard Machy. & Supplies, Montreal.  
Williams Machy. Co., A. R., Toronto.  
Williams & Wilson, Ltd., Montreal, Que.

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Can. Fairbanks-Morse Co., Montreal.  
Cleveland Twist Drill Co., Cleveland.  
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Morse Twist Drill & Mach. Co., New Bedford, Mass.  
Pratt & Whitney Co., Dundas, Ont.

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Perrin, Wm. R., Toronto.  
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**METAL SAWS**  
See Saws.

**METAL SAWS, POWER**  
Hoefler Mfg. Co., Freeport, Ill.

**METALS**  
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.  
Canada Metal Co., Toronto, Ont.  
Rice Lewis & Son, Toronto, Ont.  
Standard Machy. & Supplies, Montreal.

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Can. Winkley Co., Ltd., Windsor, Ont.

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Taylor, J. A. M., 318 Stair Bldg., Toronto.  
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**MILLS, SAND**  
Frost Mfg. Co., Chicago, Ill.

**MILL MACHINERY**  
Alexander Fleck, Ltd., Ottawa.  
Greenfield Tap & Die Corp., Greenfield.  
Wells Bros. of Canada, Galt, Ont.

**MILLING ARBORS**  
Kearney & Trecker Co., Milwaukee, Wis.

**MILLING ATTACHMENTS**  
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Bertram & Sons Co., John, Dundas, Ont.  
Brown & Sharpe Mfg. Co., Providence.  
Canada Machinery Corp., Galt, Ont.  
Cincinnati Milling Machine Co., Cincinnati.  
Ford-Smith Mach. Co., Hamilton, Ont.  
Fox Machy. Co., Jackson, Mich.  
Foss Machy. & Sply Co., G. F., Montreal.  
Harding Bros., Inc., Chicago, Ill.  
Hendey Mach. Co., Torrington, Conn.  
Hinckley Machine Works, Hinckley, Wis.  
Kearney & Trecker Co., Milwaukee, Wis.  
Kemp Smith Mfg. Co., Milwaukee, Wis.  
Niles-Bement-Pond Co., New York.  
Pratt & Whitney Co., Dundas, Ont.  
Taft-Peirce Mfg. Co., Woonsocket, R.I.  
Williams & Wilson, Ltd., Montreal, Que.

**MILLING MACHINES, AUTOMATIC**  
Belton Mach. Tool Co., Bridgeport, Conn.  
Bitts Machine Co., Rochester, N.Y.  
Williams & Wilson, Ltd., Montreal, Que.

**MILLING CUTTERS**  
Atkins & Co., Ltd., Wm., Sheffield, Eng.  
Cleveland Milling Machine Co., Cleveland.  
Kearney & Trecker Co., Milwaukee, Wis.  
Marshall, Son & Bunney, Toronto.  
Williams & Wilson, Ltd., Montreal, Que.

**MILLING MACHINES HAND**  
Bristol Machine Tool Co., Bristol, Conn.

**MILLING MACHINES, THREAD**  
Gisholt Machine Co., Madison, Wis.  
Harding Bros., Inc., Chicago, Ill.  
Gray Ball Bearing Co., Ltd., Toronto.  
United States Mach. Tool Co., Cincinnati.  
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Ford-Smith Mach. Co., Hamilton, Ont.  
Fox Machy. Co., Jackson, Mich.  
Garlock-Walker Machy. Co., Toronto, Ont.  
Gooley & Edmund, Cortland, N.Y.  
Harding Bros., Inc., Chicago, Ill.  
Kearney & Trecker Co., Milwaukee, Wis.  
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Niles-Bement-Pond Co., New York.  
Pratt & Whitney Co., Dundas, Ont.  
United States Mach. Tool Co., Cincinnati.  
Whitney Mfg. Co., Hartford, Conn.  
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Fox Machy. Co., Jackson, Mich.  
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Foss Machy. & Sply Co., G. F., Montreal.  
Fox Machy. Co., Jackson, Mich.  
Garlock-Walker Machy. Co., Toronto, Ont.  
Garvin Machine Co., New York.

Gooley & Edmund, Inc., Cortland, N.Y.  
Harding Bros., Inc., Chicago, Ill.  
Hendey Machine Co., Torrington, Conn.  
Kearney & Trecker Co., Milwaukee, Wis.  
Kemp Smith Mfg. Co., Milwaukee, Wis.  
LeBlond Mach. Tool Co., R. K., Cincinnati.  
Niles-Bement-Pond Co., New York.  
Pratt & Whitney Co., Dundas, Ont.  
Williams & Wilson, Ltd., Montreal, Que.

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Can. Fairbanks-Morse Co., Montreal.  
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Garlock-Walker Machy. Co., Toronto, Ont.  
Garvin Machine Co., New York.  
Pratt & Whitney Co., Dundas, Ont.  
Williams & Wilson, Ltd., Montreal, Que.

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Brown & Sharpe Mfg. Co., Providence.  
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Geometric Tool Co., New Haven, Conn.  
Kemp Smith Mfg. Co., Milwaukee, Wis.  
Rice Lewis & Son, Toronto, Ont.  
Tabor Mfg. Co., Philadelphia, Pa.  
Williams & Wilson, Ltd., Montreal, Que.

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Dominion Bridge Co., Montreal, Que.  
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Modern Tool Co., Erie, Pa.  
Pratt & Whitney Co., Dundas, Ont.

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Can. Fairbanks-Morse Co., Montreal.  
Williams Machy. Co., A. R., Toronto.  
Williams & Wilson, Ltd., Montreal, Que.

**MIXERS, SAND**  
Frost Mfg. Co., Chicago, Ill.

**MODEL WORK**  
Windsor Mach. & Tool Co., Windsor, Ont.

**MORTISING MACHINES**  
Canada Machinery Corp., Galt, Ont.  
Garlock-Walker Machy. Co., Toronto, Ont.  
Gray Ball Bearing Co., Ltd., Toronto.

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Can. General Electric Co., Toronto.  
Garlock-Walker Machy. Co., Toronto, Ont.  
Lancashire Dynamo & Motor Co., Ltd., Toronto.  
MacGovern & Co., Montreal, Que.  
Williams Machy. Co., A. R., Toronto.  
Williams & Wilson, Ltd., Montreal, Que.

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**MOTORCYCLE FRAME AND FORK**  
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**MULTI-DRILLING, MULTI-BORING, MULTI-TAPPING MACHINERY.**  
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Turner Brass Works, Sycamore, Ill.

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**NICKEL**  
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Pilot Steel & Tool Co., Montreal, Que.

**NICKEL SILVER**  
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.

**NICKEL STEEL**  
See Steel.

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Landis Machine Co., Waynesboro, Pa.

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National-Acme Co., Cleveland, Ohio.  
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Victor Tool Co., Waynesboro, Pa.  
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Landis Machine Co., Waynesboro, Pa.  
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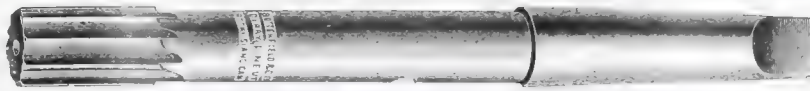
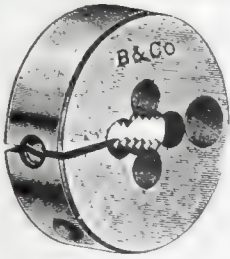
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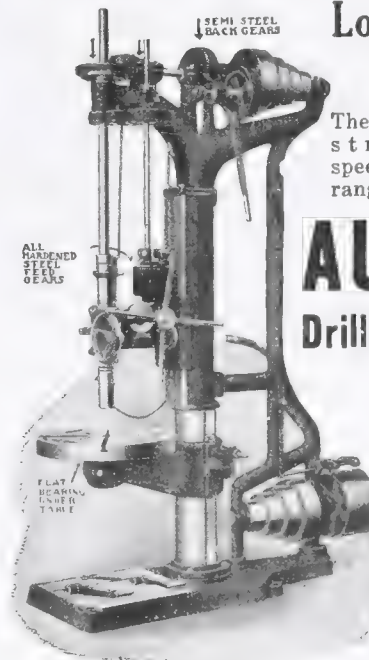
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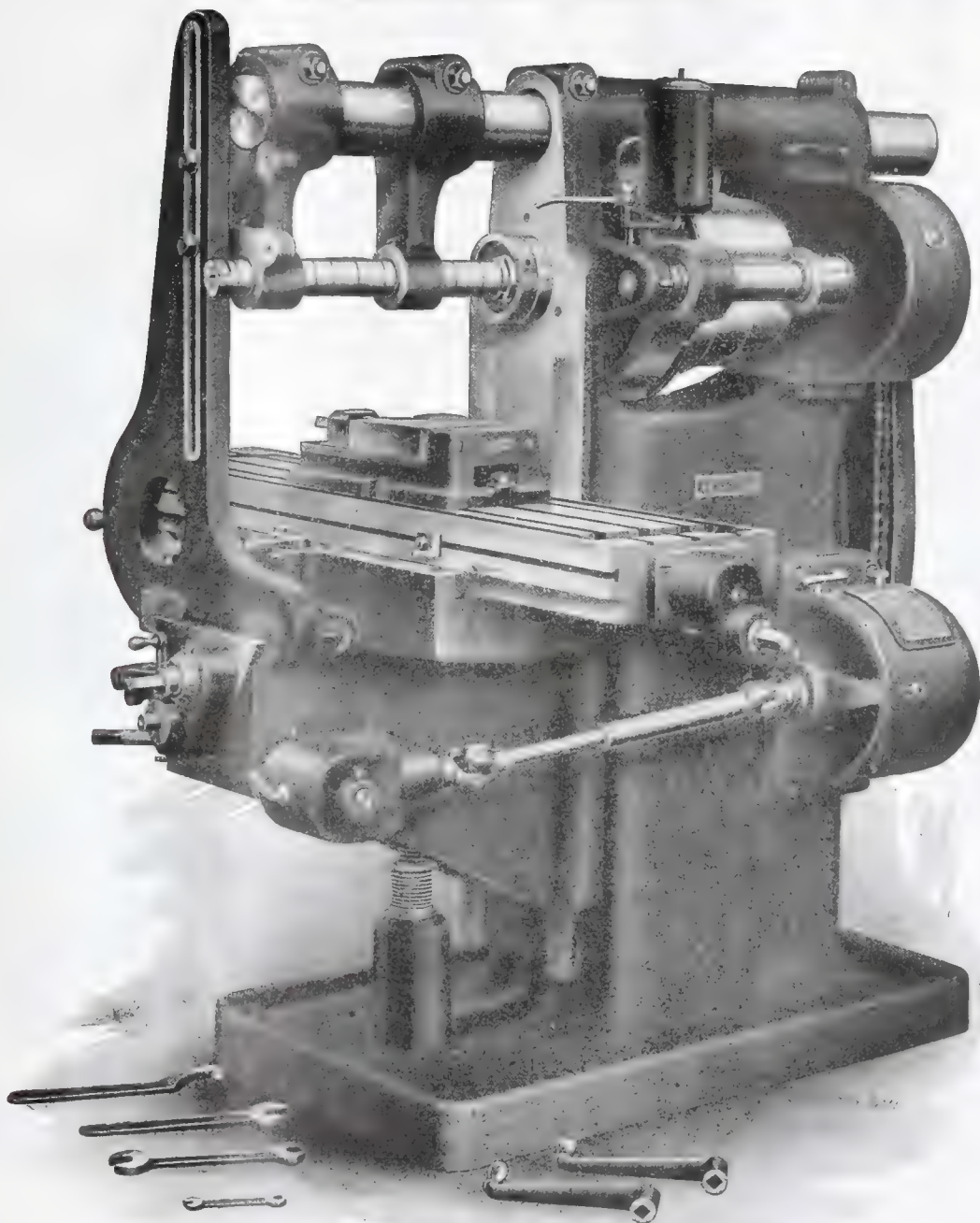
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Can. Drawn Steel Co., Hamilton.

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Toledo Machine &amp; Tool Co., Toledo, O.

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Garlock-Walker Machy. Co., Ltd., Toronto.

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National Machy. Co., Tiffin, Ohio.

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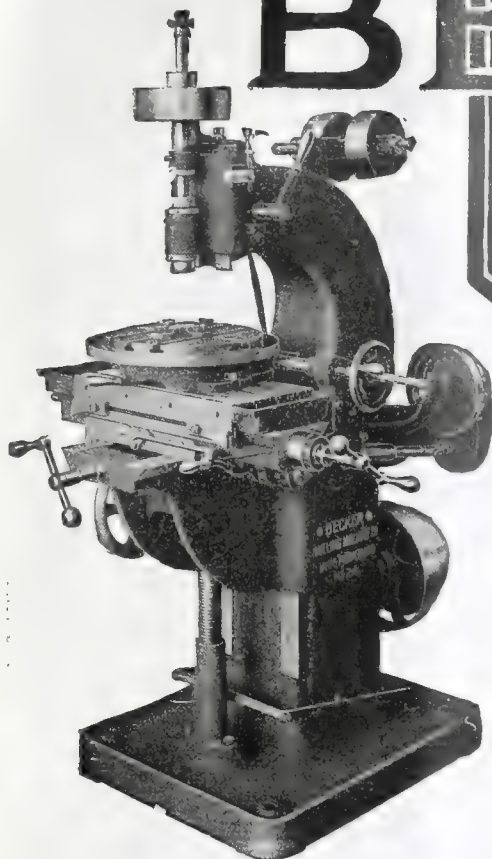
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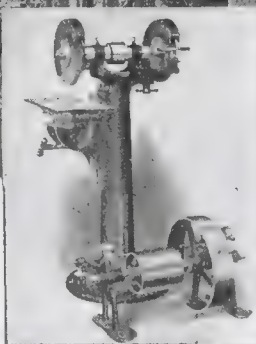
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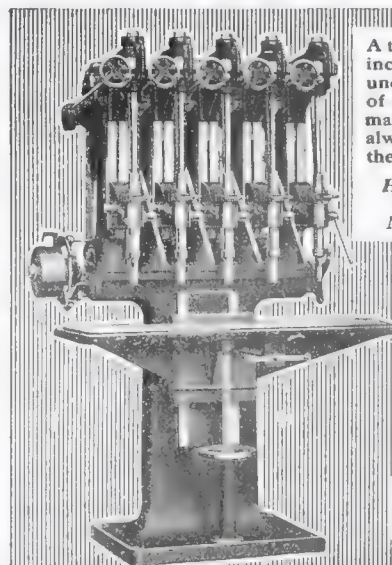
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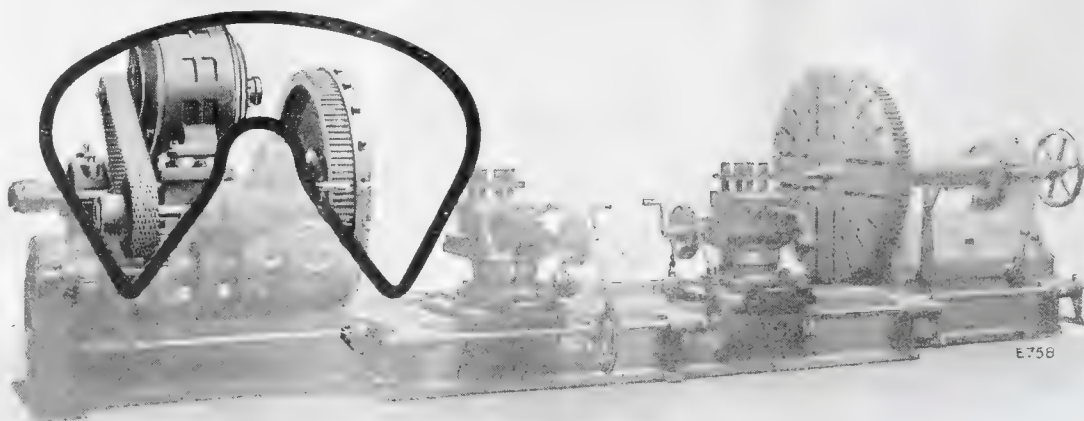
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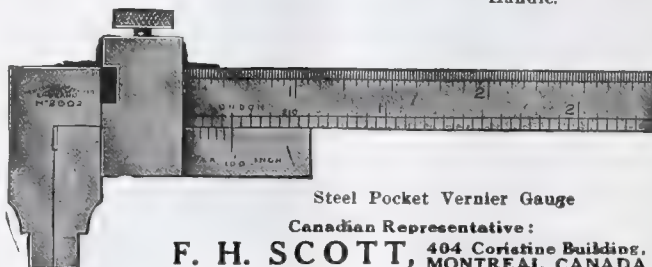
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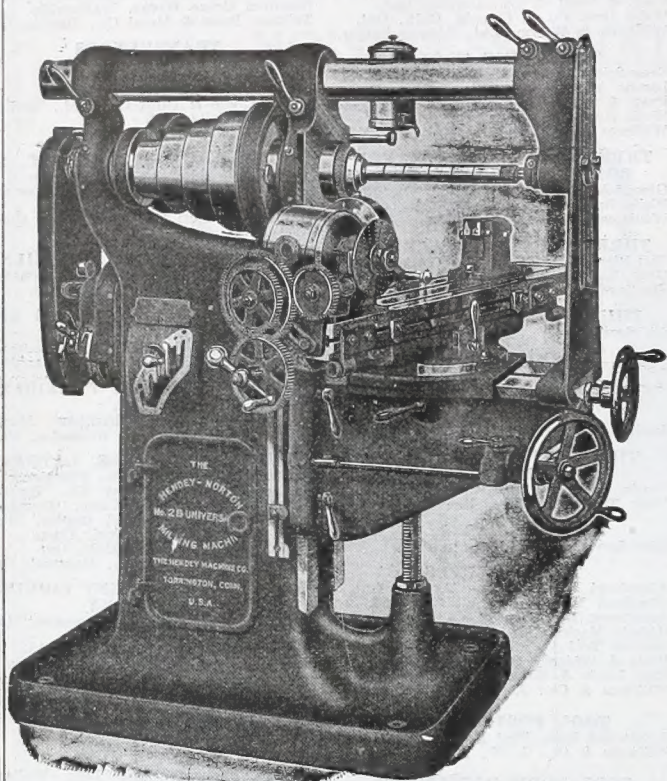
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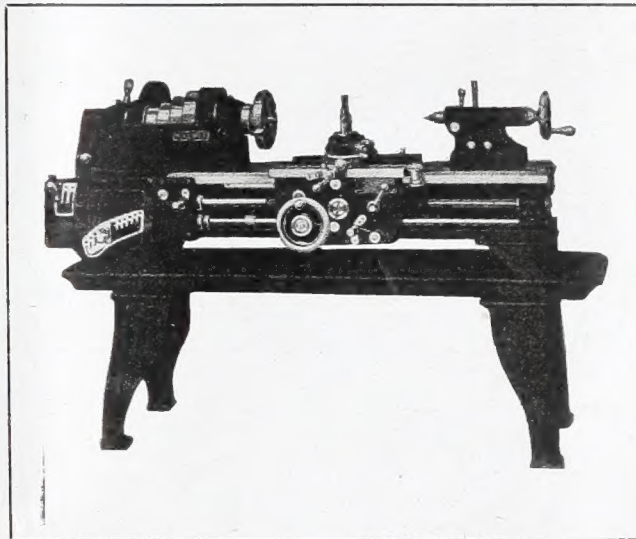
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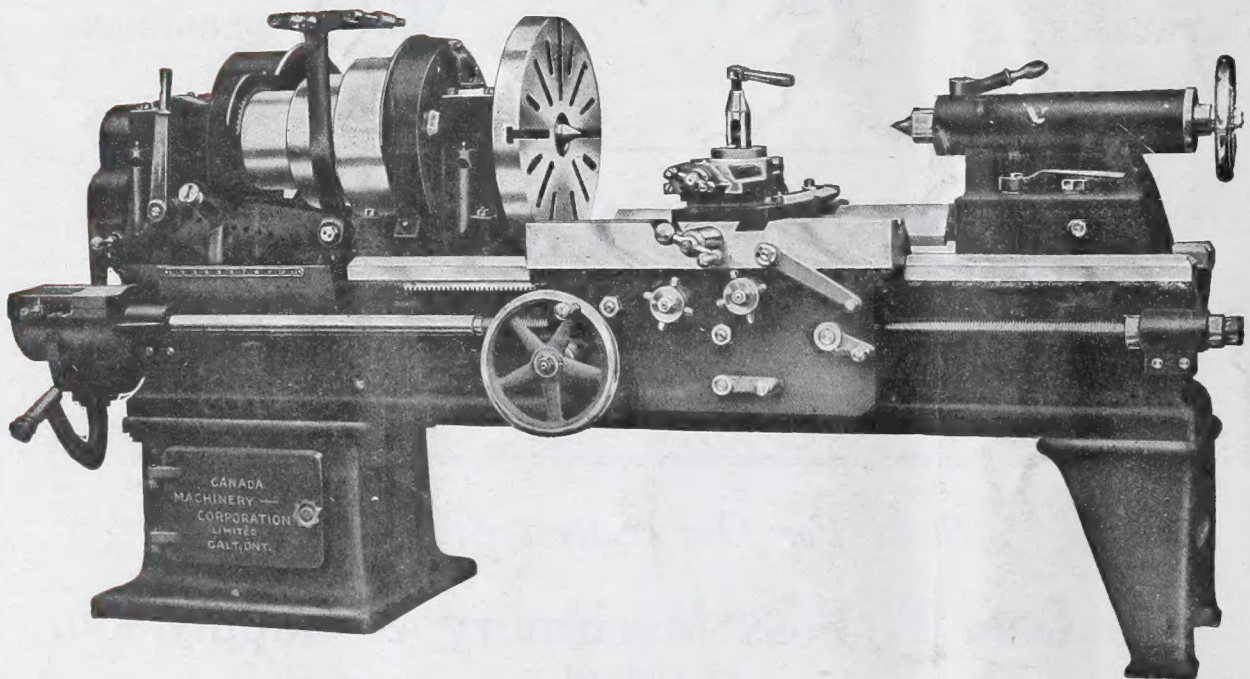


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